PRO → U130

User Manual
A91M.12-279328.00-0991

PRO → U130
Type: PRO-U130
Version 4.0
Diskettes 1 x $3^1/_2$" and 3 x $5^1/_4$"

Configuration Guide
DOK-279467.22-0991

Translation of the German Description DOK-272872

Belongs to software kit E-No. 424-247175

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Part III KOS 130/131

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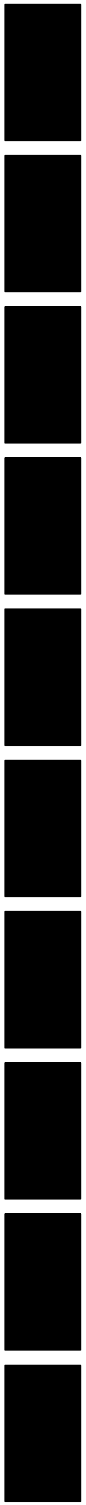

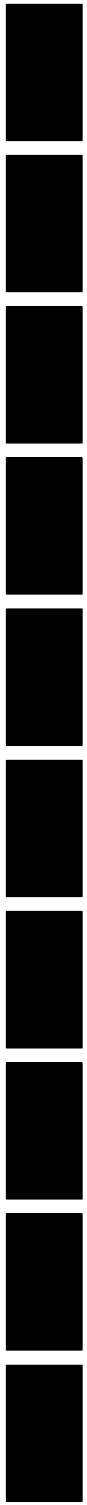

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Application Note

Caution The relevant regulations must be observed for control applications involving safety requirements.
For reasons of safety and to ensure compliance with documented system data, repairs to components should be performed only by the manufacturer.

Training
AEG offers suitable training that provides further information concerning the system (see addresses).

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Terminology

Note This symbol emphasizes very important facts.

Caution This symbol refers to frequently appearing error sources.

Warning This symbol points to sources of danger that may cause financial and health damages or may have other aggravating consequences.

Expert This symbol is used when a more detailed information is given, which is intended exclusively for experts (special training required). Skipping this information does not interfere with understanding the publication and does not restrict standard application of the product.

Path This symbol identifies the use of paths in software menus.

Figures are given in the spelling corresponding to international practice and approved by SI (Système International d' Unités).
I.e. a space between the thousands and the usage of a decimal point
(e.g.: 12 345.67).

Abbreviation	Explanation
A-byte	Address byte in SEAB-1F
A1-byte	Subaddress byte in SEAB-1F
IL	Instruction list
BGT	Subrack
D1-, D2-, D3-, D4-byte	1st - 4th data byte in SEAB-1F
DEZ	DEZ 160
DM	Double-point information
E/A-Baugruppe	Input/output module
EZM	Real-time information
F-byte	Function byte in SEAB-1F
GRW	Limit
KOS	KOS 130/131
MW	Measurand
NLQ	Near Letter Quality
PV number	Process variable number
SU	Storage upload (monitoring direction)
SD	Storage download (control direction)
TAW	Timer - actual value
TSW	Timer - setpoint value
OS	Outstation
WM	Word starting with marker
CAW	Counter - actual value
CSW	Counter - setpoint value

Objectives

This description is intended for the designer of Geadat U130 outstations.

The designer can
- install the programming panel,
- install the software,
- plan with the software,
- document the design thus created,
- transfer the created parameters,
- pass the created program to the controller and start it.

Arrangement of This Guide

General This part contains the introduction, the use of the diskettes and the complete table of contents for the manual.

Part I This part describes how you can design the Geadat U130 outstation with PRO → U130.

Part II This part describes how you can parametrize the DEZ 160 directly or with PRO → U130.

Part III This part describes how you can parametrize the KOS 130/131 directly or with PRO → U130.

Part IV contains the index.

Part V contains the list of addresses and the user comments.

Related Documents

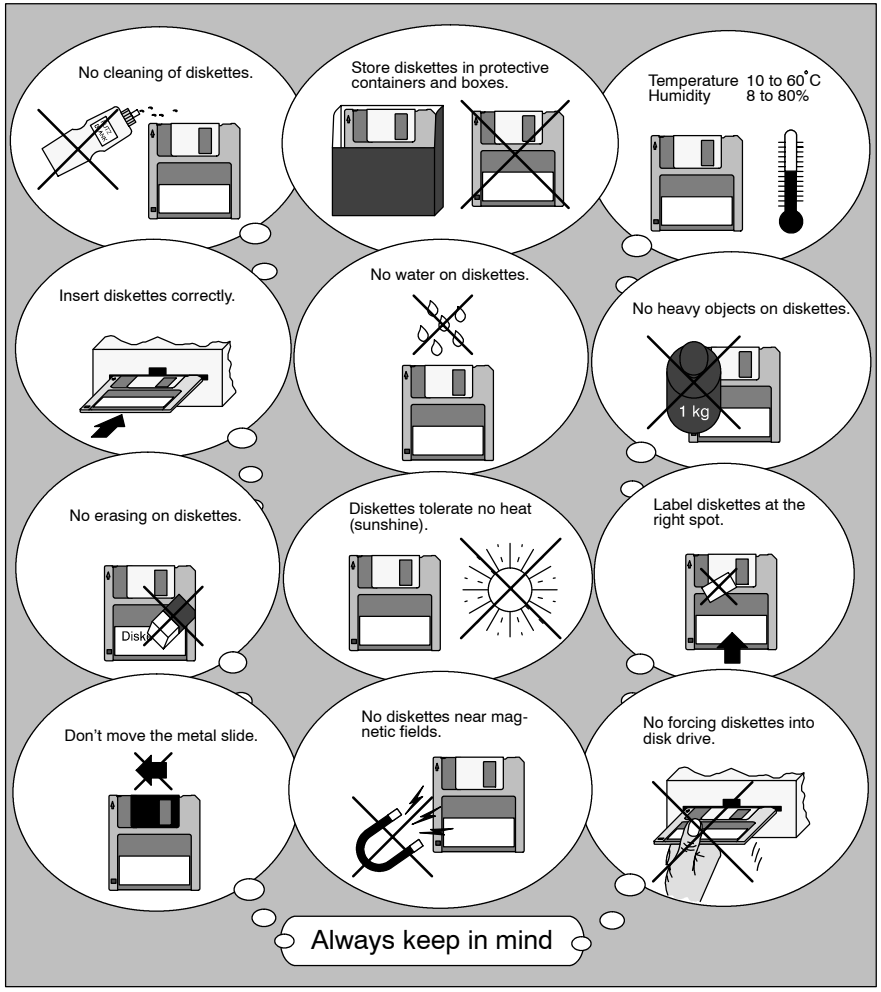
Geadat U130 User Manual
Dolog AKF → A030/A130 User Manual

Validity Note

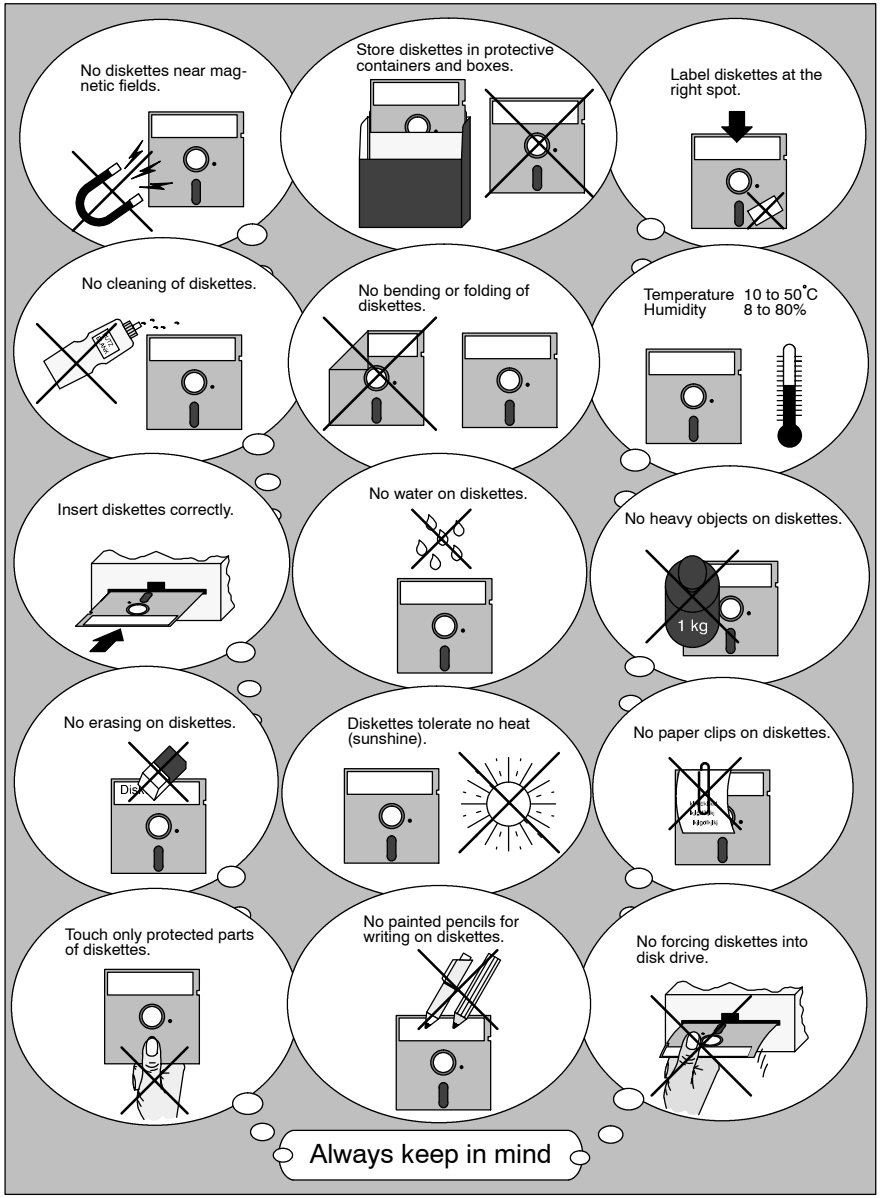
This description is valid for the:

Software	PRO → U130, Version 4.0	
	Dolog AKF → A030/A130, Version 2.0	
Basic software versions	ALU 131	247138.02
	DEZ 160	247154.00
	KOS 130/131	241128.09

Handling 3 $^{1}/_{2}$” Diskettes


No cleaning of diskettes.
Store diskettes in protective containers and boxes.
Temperature 10 to 60°C
Humidity 8 to 80%
Insert diskettes correctly.
No water on diskettes.
No heavy objects on diskettes.
1 kg
No erasing on diskettes.
Diskettes tolerate no heat (sunshine).
Label diskettes at the right spot.
Don't move the metal slide.
No diskettes near magnetic fields.
No forcing diskettes into disk drive.
Always keep in mind

Handling 5 1/4" Diskettes


No diskettes near magnetic fields.
Store diskettes in protective containers and boxes.
Label diskettes at the right spot.
No cleaning of diskettes.
No bending or folding of diskettes.
Temperature 10 to 50°C
Humidity 8 to 80%
Insert diskettes correctly.
No water on diskettes.
No heavy objects on diskettes.
1 kg
No erasing on diskettes.
Diskettes tolerate no heat (sunshine).
No paper clips on diskettes.
Touch only protected parts of diskettes.
No painted pencils for writing on diskettes.
No forcing diskettes into disk drive.
Always keep in mind

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Part I
Configuration Instructions

Chapter 1
Introduction

1.1 The PRO → U130 Program Package

comprises three 5 $^1/_4$" diskettes with 360 kbytes each, one 3 $^1/_2$" diskette with 720 kbyte and the user manual.

1.2 System Requirements

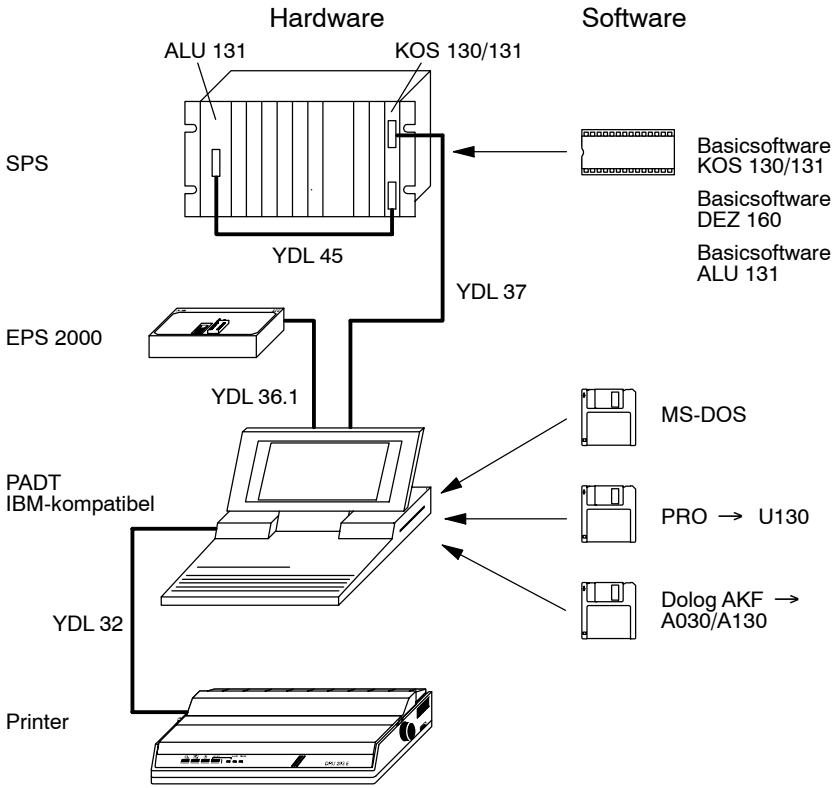


Figure 1 Elements for designing and programming

1.2.1 Hardware

PUTE
P500
P600
Compaq 286/386
IBM AT 286

Printer (each with parallel interface)
DRU 292/293
DRU 120
DRU 096
DRU 1200

EPROM _ Programming station EPS 2000

1.2.2 Software

- MS-DOS as of version 3.2
- Dolog AKF → A030/A130

1.3 Installation

Installation PRO → U130 from 3 x 5 $^1/_4$" diskettes.

Switch on device (operating system level) indicator "C>".

Step 1 Diskette 1 of 3 in diskette drive A or B

Step 2 Installation routine with call "A:INSTAL" or "B:INSTAL", depending on selected drive, and start <Cr>.

Step 3 Specify drive for installation. If installation on hard disk C, only confirm the default value with <Cr>. Otherwise enter drive identifier (C,D) and <Cr>.

☞ **Note** Installation begins

Step 4 After request, insert diskette 2 of 3 and press any key.

Step 5 After request, insert diskette 3 of 3 and press any key.

Step 6 Specify which drive
Dolog AKF → A030/A130 should be (is) installed on by entering C or D and <Cr>.

A message appears on the screen when the installation has been terminated.

Installation PRO → U130 from 1 x 3 $^1/_2$" diskette as above except that steps 4 and 5 are omitted.

Chapter 2
Overview and General Information

2.1 Summary of Features

PRO → U130 supports the user during the design and start-up of the Geadat U130 outstation.

- A subrack including the subrack assignments is automatically determined when the data points are specified.
- A certain hardware (subrack and I/O modules) and their data point assignments can be selected as required.
- Special characteristics can be assigned to the data points.
- An instruction list (IL) is generated based on the parameters entered.
- The instruction list is transferred to Dolog AKF → A030/A130.
- The generated parameters are transferred to KOS130/131 and DEZ160 by Eprom. (A transfer to RAM is also possible for KOS130/131).
- Documentation of the system by printing the
  - bill of materials
  - hardware configuration
  - data point reference list
  - table of measurand limits
  - KOS130/131 parameters
  - DEZ160 parameters
- The entered and generated files are archived on hard disk or diskette

2.2 Rough Structure

Data input (Chap. 5.2)

- Project Data
- General Datas of Outstation
- Number of Data Points
- Selection of Subrack
- Selection of Modules / Parameterization
- Measurand Processing
- List of Data Points
- Edit Library

Data Archive (Chap. 5.3)

- Read Data
- Save Data
- Delete File
- Change Drive

Generation of IL (Chap. 5.4)

- Start IL generation (German)
- Start IL generation (English)
- (Generate KOS130/131 parameters)

Transfer and Start AKF130 (Chap. 5.5)

- Transfer IL to AKF130
- Start AKF130

Printer Output (Chap. 5.6)

- Bill of Materials
- Hardware Configuration
- List of Data Points
- Table of Measurand Limits
- All Lists
- Selection of Printers

Display the Bill of Materials on the Screen (Chap. 5.7)

DEZ 160 Parametrization (Part II)

KOS 130/131 Parametrization (Part III)

2.3 Keyboard Operating

If an instruction is in pointed brackets < > in the following description, this means that the corresponding key must be pressed.
<Cr> = Press RETURN key.
<Alt> + <Ctrl> + <Del> = Warm restart. Press all three keys simultaneously.
<F1> → <F3> = Press the function keys F1 and F3 one after the other.

US keyboard	German keyboard
<Esc>	<Eing lösch>
<Ctrl>	<Strg>
<Home>	<Pos1>
<End>	<Ende>
<Prtsc>	<Druck>
<PgUp>	<Figure >↑
<PgDn>	<Figure >↓
<Ins>	<Einf>
<Del>	<Entf> or <Lösch>
<Return>	<Übernahme> (also <Enter> or <↵>)

Function keys

The individual submenues are selected with the function keys.

Pressing <F9> always returns to the previous menu level.

Pressing <F10> calls the help text.

Arrow keys (cursor keys)

These keys select or change the parameters in some menues.

Caution If your PADT does not have a separate cursor block, make sure that the <Num Lock> key is switched off as otherwise the number block will be active.

<Return> key

The input to the line editor is terminated or the selected parameters are entered with this key.

<Esc> key

Pressing this key causes a return to the previous menu level.

Toggling

Pressing the <Return> key repeatedly causes different settings to be selected.

2.4 General Information

This symbol specifies how you can select the described function.
Counting always starts with the main menu.
The function keys which must be pressed in the main menu are indicated in brackets.

Example:
“Data Input”,”Selection of Subrack”
(F1 → F4)

Note The designations Ex By in the titles are also displayed at the lower right of the screen. They refer to the particular menu level and menu image.
The chapter describing a certain screen page can thus be easily found using a cross reference list.

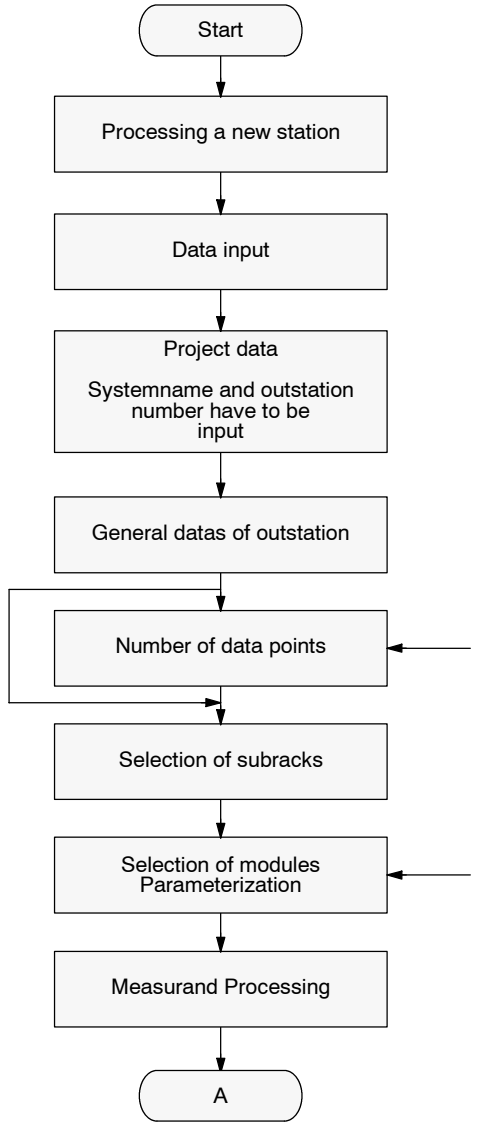
Remark window:

If incorrect input is made when planning with PRO → U130 or if a value limit is exceeded, this is displayed on the screen with the corresponding message. In

order to delete this remark window on the screen, press any key. You can then correct the input and continue with your project planning.

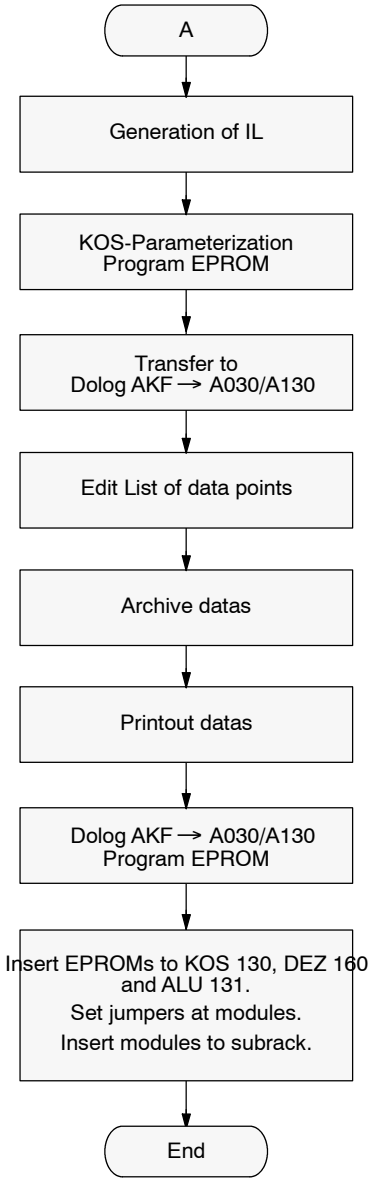
Chapter 3
Overview How To Work

3.1 Sequence Diagram

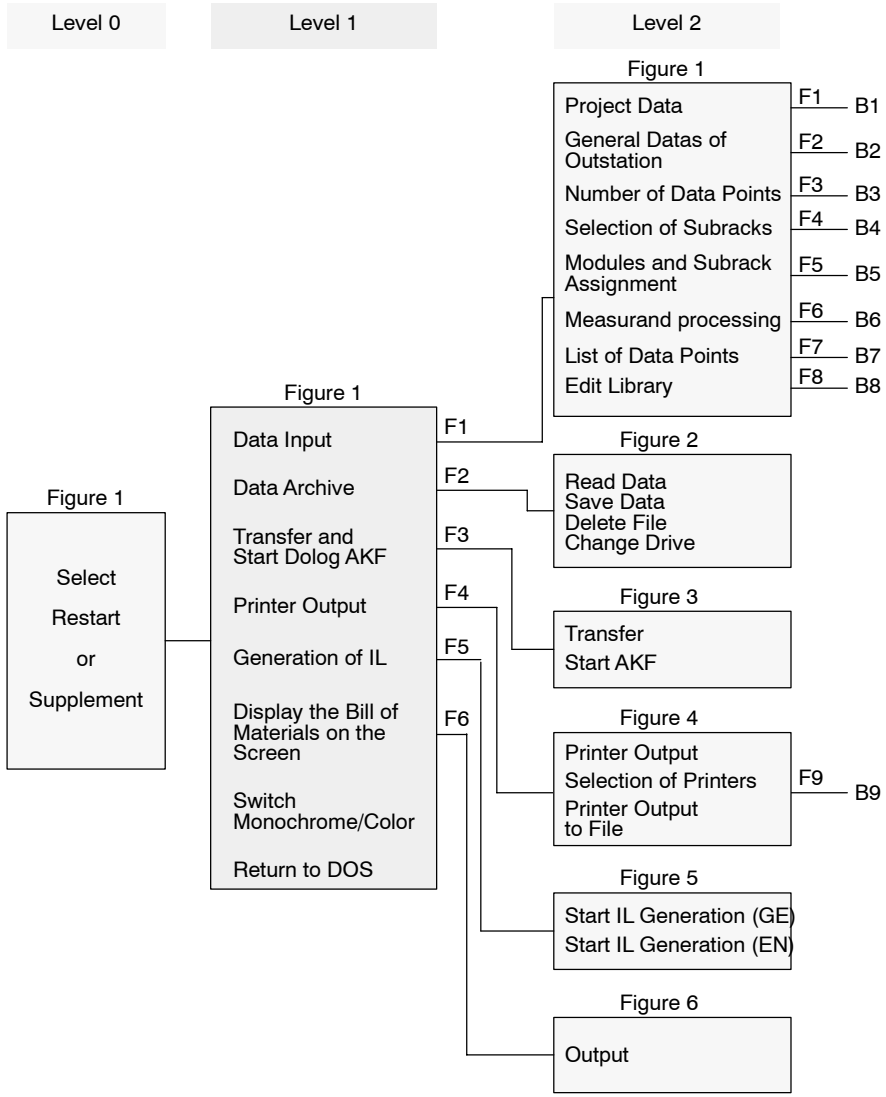


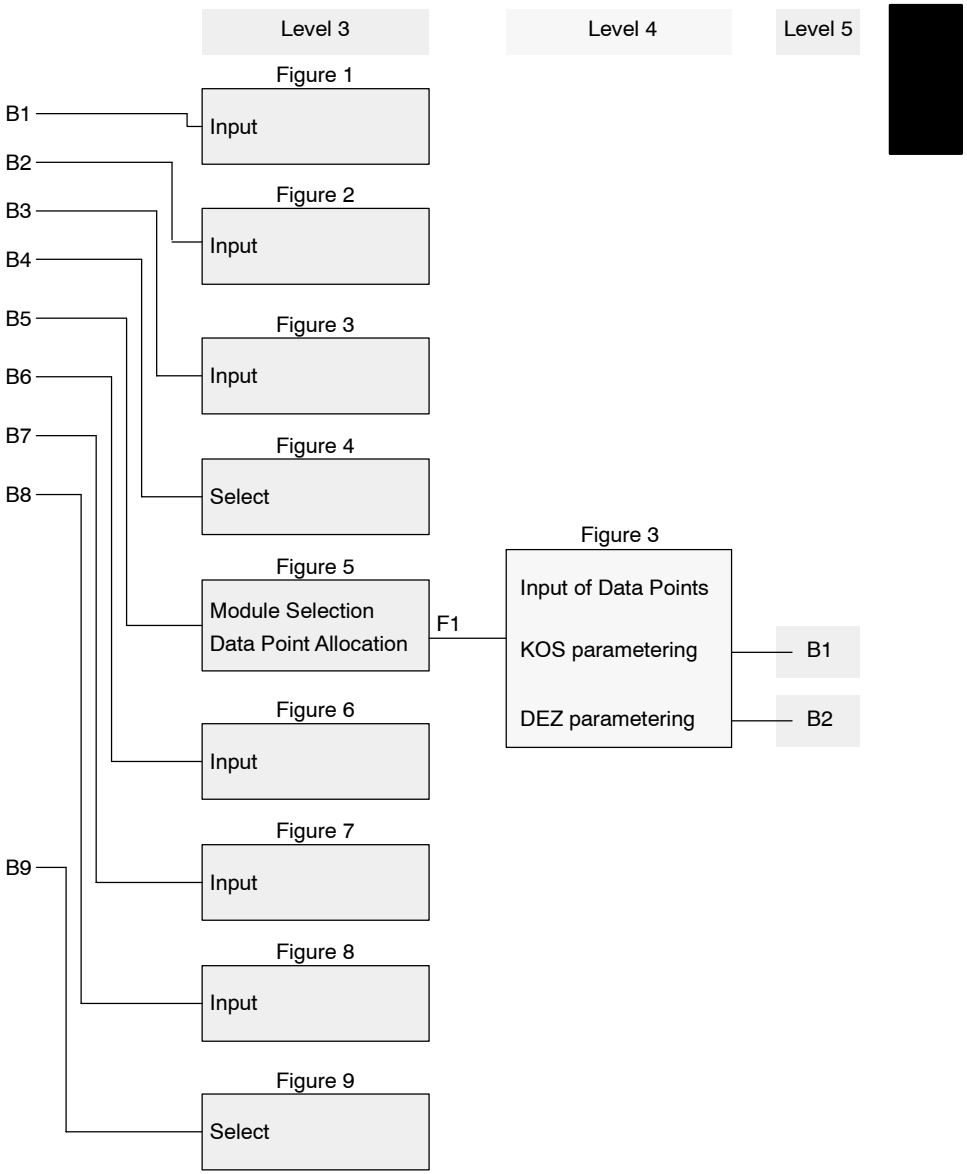
Only the modules DAP 112, DEP 112, ADU 116 and DAU 108 are taken into consideration.
If other modules are used, go directly to subrack selection.

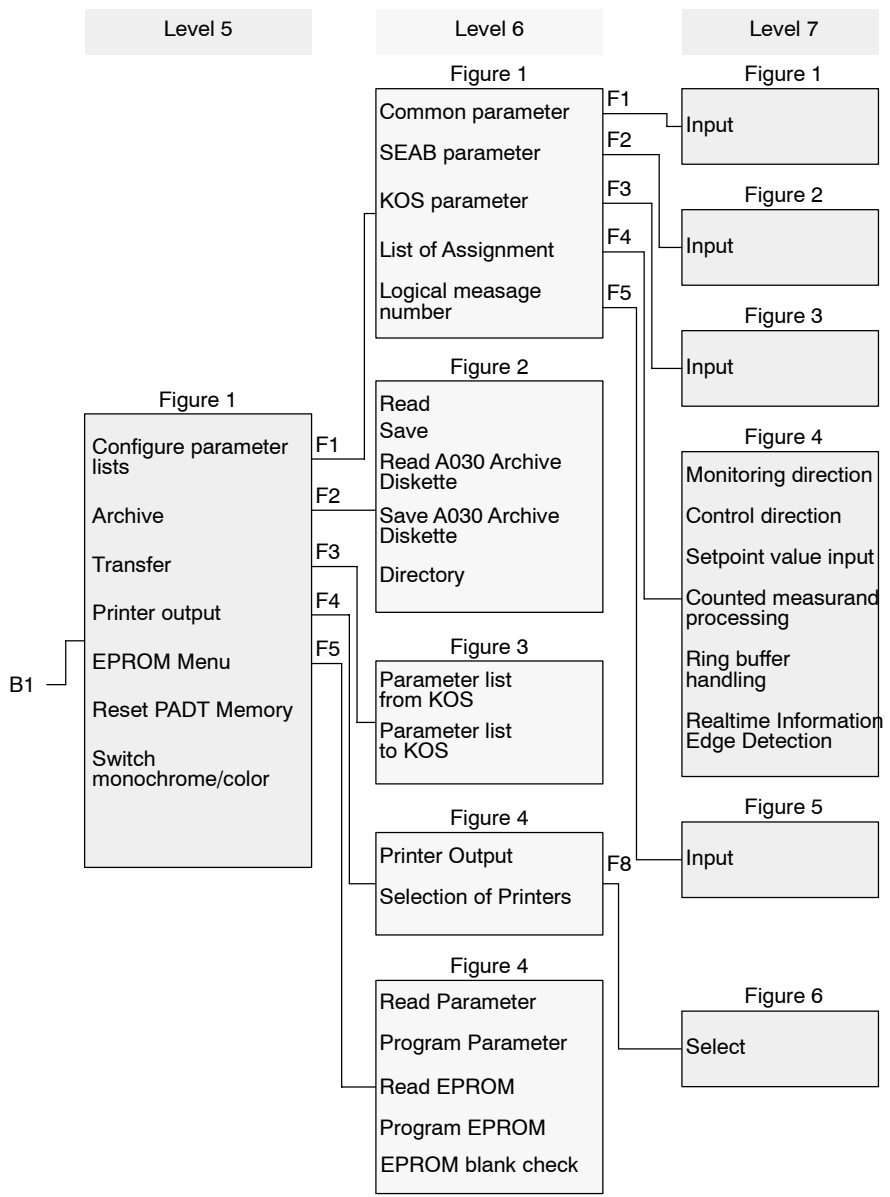
If DEZ 160 is used, call DEZ 160 parametrization.

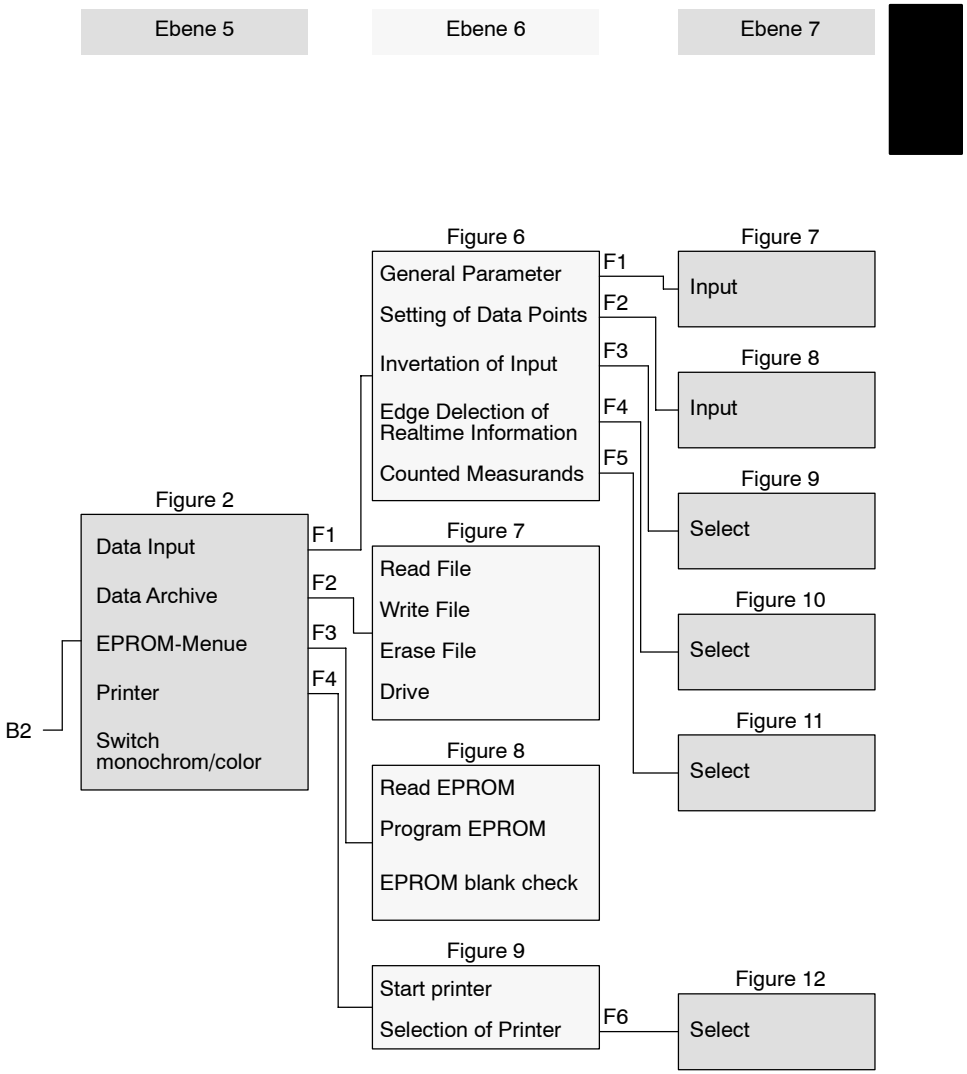

A
Generation of IL
KOS-Parameterization
Program EPROM
Transfer to
Dolog AKF → A030/A130
Edit List of data points
Archive datas
Printout datas
Dolog AKF → A030/A130
Program EPROM
Insert EPROMs to KOS 130, DEZ 160
and ALU 131.
Set jumpers at modules.
Insert modules to subrack.
End

3.2 Tree Structure of the Menues




Level 3
Level 4
Level 5
Figure 1
Input
Figure 2
Input
Figure 3
Input
Figure 4
Select
Figure 5
Module Selection
Data Point Allocation
Figure 6
Input
Figure 7
Input
Figure 8
Input
Figure 9
Select
B1
B2
B3
B4
B5
B6
B7
B8
B9
F1
Figure 3
Input of Data Points
KOS parametering
DEZ parametering
B1
B2

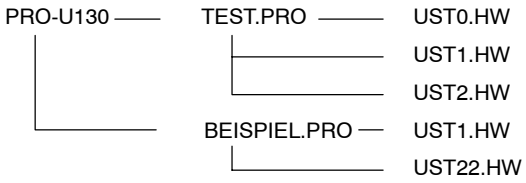

Level 5
Level 6
Level 7
Figure 1
Configure parameter lists
Archive
Transfer
Printer output
EPROM Menu
Reset PADT Memory
Switch monochrome/color
B1
F1
F2
F3
F4
F5
Figure 1
Common parameter
SEAB parameter
KOS parameter
List of Assignment
Logical measage number
Figure 2
Read
Save
Read A030 Archive Diskette
Save A030 Archive Diskette
Directory
Figure 3
Parameter list from KOS
Parameter list to KOS
Figure 4
Printer Output
Selection of Printers
Figure 4
Read Parameter
Program Parameter
Read EPROM
Program EPROM
EPROM blank check
F1
F2
F3
F4
F5
F8
Figure 1
Input
Figure 2
Input
Figure 3
Input
Figure 4
Monitoring direction
Control direction
Setpoint value input
Counted measurand processing
Ring buffer handling
Realtime Information Edge Detection
Figure 5
Input
Figure 6
Select


Ebene 5
Ebene 6
Ebene 7
Figure 2
Data Input
Data Archive
EPROM-Menue
Printer
Switch monochrom/color
B2
F1
F2
F3
F4
Figure 6
General Parameter
Setting of Data Points
Invertation of Input
Edge Delection of Realtime Information
Counted Measurands
F1
F2
F3
F4
F5
Figure 7
Read File
Write File
Erase File
Drive
Figure 8
Read EPROM
Program EPROM
EPROM blank check
Figure 9
Start printer
Selection of Printer
F6
Figure 7
Input
Figure 8
Input
Figure 9
Select
Figure 10
Select
Figure 11
Select
Figure 12
Select

3.3 Index Structure

During installation, a subindex PRO-U130 was set up. PRO → U130 opens a system index under this index. The individual files of the outstation are stored in this system index.

Example:



The name of the system index and the outstation number are entered in the project data menu. (see Chap. 5.2.1)

Chapter 4
Configuration

4.1 Definition of the Communications Ports

The outstation is coupled with the controller by the KOS 130/131. It is the link between ALU 131 and the serial bus SEAB-1F.

Data is transferred between ALU 131 and KOS 130/131 using the SU/SD interface.

SU = Storage Upload
SD = Storage Download

SU transports data from ALU 131 to KOS 130/131 (monitoring direction).

SD transports data from KOS 130/131 to ALU 131 (control direction).

The transport capacity in both directions is 41 words.
The 1st word in SU (WM737) and SD (WM881) is reserved for internal control and status transport.
Therefore only 40 words are available for the data transfer.

☞ **Note** In the monitoring direction (SU), the capacity can be doubled by a multiplexer. You need not take any special measures here. PRO → U130 automatically installs this multiplexer.
If real-time information is planned, the capacity is also doubled or even tripled. However, remember that the transport time for 41 words is 85 msec, which also affects the reaction time.

The instruction list (IL) addresses memory areas SU and SD as follows (see also Dolog AKF → A030/A130 manual):

Table 1 Access to Memory Areas SU and SD

SU	SD
WM737	WM881
WM753	WM897
WM769	WM913
WM785	WM929
WM801	WM945
WM817	WM961
MW833	WM977
WM849	WM993
WM865	WM1009
TAW1	TSW1
.	.
.	.
TAW16	TSW16
CAW1	CAW1
.	.
.	.
CAW16	CSW16

WM = Word as of marker
TAW = Timer- actual value
TSW = Timer- setpoint value
CAW = Counter- actual value
CSW = Counter- setpoint value

These SU/SD addresses can be found in the data point list and in the KOS 130/131 parametrization.

Data assignments in SU/SD are also homogenous and word-by-word in order to ensure homogeneity of the 2D-telegrams in the SEAB-1F.

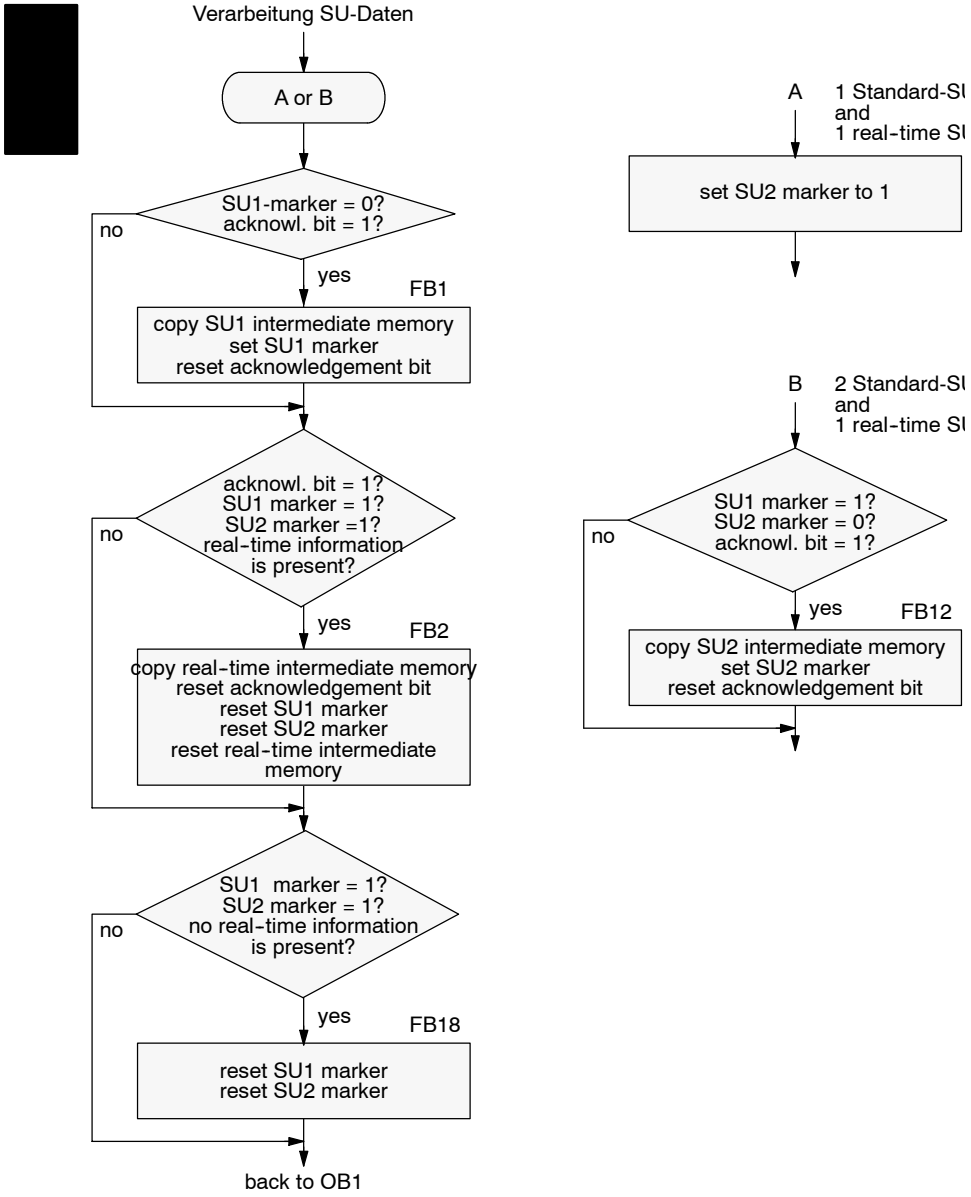


Figure 2 SU-Multiplexer

4.2 Definition of the Data Types

4.2.1 Monitored Information

Projektierbar bei DEP 112, DAP 102, DAP 103, DEZ 160

Zuordnung In groups of 8 inputs each

Verarbeitung No special processing. Two input groups are assigned to one word and passed on to the KOS 130/131. **No transient behavior.**

4.2.2 Double-point Information

Projektierbar bei DEP 112, DAP 102, DAP 103, DEZ 160

Zuordnung In groups of 8 inputs each

Verarbeitung Inputs 1 and 2, 3 and 4, 5 and 6, 7 and 8 of an input group are each checked for malposition. If there is a malposition (same state at both inputs), the transfer to the KOS 130/131 is suppressed for a certain time. This time can be parametrized per outstation. (see also Chap. 5.2.2)

☞ **Note** Inputs which are not used should be alternately assigned the level 0 and 1 as otherwise malpositions will be recognized constantly.

4.2.3 Return Information

Projektierbar bei DAP 102, DAP 103

Zuordnung In groups of 8 inputs each
The assignment is automatic if an actively cancelled command is planned. Return information cannot be overwritten or deleted during project planning. The first return information of an input group is assigned to the first instruction, etc.

Verarbeitung Return information is treated as double-point information. 1 level at the input cancels the assigned command.

4.2.4 Real-time Information

Projektierbar bei DEZ 160

Zuordnung In groups of 8 inputs each
Assignments must be made without a gap starting with the 1st or 3rd input group.

Verarbeitung The real-time information is requested by DEZ 160 and entered in the buffer for real-time inforamation. If the buffer is full, no new real-time information is requested until the buffer can be emptied by a transfer to the KOS 130/131. The current process state of the information inputs is always transferred to KOS 130/131.

4.2.5 System Information

Projektierbar bei Cannot be planned, virtual information.

Zuordnung Is always assigned to the 1st word in SU (WM737).

Verarbeitung The organization information contains the following information:
Module disturbed (1-16 binary coded) bit 2^0 to 2^4.
More than one module failed bit $2^5 = 1$.
No return information for last actively cancelled command bit $2^6 = 1$.
Status of the SU bit 2^{15} and 2^{14}:

00 = 1st standard SU
10 = 2nd standard SU
01 = real-time information SU
11 = not defined

4.2.6 Counted Measurands

Projektierbar bei DEP 112, DAP 102, DAP 103, DEZ 160

Zuordnung In groups of 8 inputs each. The number of actually required inputs is also specified.

Verarbeitung **DEZ 160:** Counted pulses up to 50 Hz are counted in the DEZ 160 and passed on as a 16-bit counted measurand. In the IL, this counted measurand is only passed on to KOS 130/131.

DEP 112, DAP 102 and DAP 103: For these modules, the counted measurands are formed in the IL. Counted pulses up to 2 Hz are possible. First there is an edge detection. The assigned marker word is incremented for each gradient edge and set to 0 when the value 65535 (FFFFH) is reached.

4.2.7 8-Bit Measurand

Projektierbar bei ADU 115, ADU 116, DAU 104

Zuordnung In groups of 8 inputs each. The number of actually required inputs is also specified.

Verarbeitung Two 8-bit measurands are assigned to one word and passed on to KOS 130/131. Only positive measurands are transferred. Negative measurands are set to 0.

4.2.8 10-Bit Measurand

Projektierbar bei ADU 115, ADU 116, DAU 104

Zuordnung In groups of 8 inputs each. The number of actually required inputs is also specified.

Verarbeitung These are 10-bit measurands plus sign. The measurand is limited to $\pm$ 1000. It is then passed on to KOS 130/131, which “shifts” the right-justified measurands to the left-justified SEAB-1F format.

4.2.9 1-Pole Commands

Projektierbar bei DAP 102, DAP 103, DAP 112

Zuordnung per outstation

Verarbeitung A command from the master station controls an output.

4.2.10 1 $^1/_2$-Pole Commands with 8 Group Contacts

Projektierbar bei DAP 103

Zuordnung per outstation

Verarbeitung The upper 8 outputs of the first DAP 103 are the group contacts for the next 8 output groups of 8 outputs each. The 10th output group is again the group contact block for the next 8 output groups.

Beispiel Slots 2 - 4 are equipped with DAP 103.
Command 1 controls output 2.1 and 2.9
Command 2 controls output 2.1 and 2.10
Command 3 controls output 2.1 and 2.11
Command 9 controls output 2.2 and 3.1
Command 10 controls output 2.2 and 3.2
Command 17 controls output 2.3 and 3.9
Command 25 controls output 2.4 and 4.1

4.2.11 1 $^1/_2$-Pole Commands with 16 Group Contacts

Projektierbar bei DAP 103

Zuordnung per outstation

Verarbeitung The group contacts for the following 16 output groups of 8 outputs each are on the 1st DAP 103.

Beispiel Slots 2 - 4 are equipped with DAP 103.
Command 1 controls output 2.1 and 3.1
Command 2 controls output 2.1 and 3.2
Command 3 controls output 2.1 and 3.3
Command 9 controls output 2.2 and 3.9
Command 10 controls output 2.2 and 3.10
Command 17 controls output 2.3 and 4.1
Command 25 controls output 2.4 and 4.9

4.2.12 2-Pole Commands

Projektierbar bei DAP 103

Zuordnung per outstation

Verarbeitung A command from the master station controls 2 outputs of a DAP 103. Outputs 1 and 9, 2 and 10, 3 and 11 etc. form a 2-pole command.

☞ **Note** A 1-of-n check is made before each command output. No further command can be given as long as a command is executing. Commands which arrive during command execution are lost.

There are three possibilities for processing the above-mentioned command types:

- Pulse commands (commands whose output time can be parametrized)
- Persistent commands
- Actively cancelled commands

The processing time can be assigned to one output group of 16 outputs.

4.2.13 Pulse Commands

The output time can be parametrized per output group. As soon as a command is output, a timer with the parametrizable output time is set and started. The command output is reset when the timer has expired.

4.2.14 Persistent Commands

A time for the duration of the telegram execution is parametrized per outstation. As soon as a command is output, a timer is set with the parametrized time and started. The command output is reset when the timer has expired.

In contrast to pulse commands, the timer here is constantly reset and restarted by sending the **same** command.

4.2.15 Actively Cancelled Commands

A cancel supervise time and a cancel link time are parametrized per outstation.

A command is output until the assigned return information arrives or the cancel supervise time has expired. The command is reset after the cancel link time has expired and not immediately after arrival of the return information.

If a command was reset after expiration of its supervise time and not cancelled by its return information, the bit 2^6 in the organization information word is reset.

Note Actively cancelled commands can only be configured for the “mixed” I/O modules DAP 102 and DAP 103.

The return information is assigned automatically.

Assignment is 1:1 for 1-pole commands. First command at output x.1, return information at input x.1.

Assignment is also 1:1 for 1 $^1/_2$-pole commands. Return information is omitted for group contacts. The corresponding inputs can be assigned as required.

For 2-pole commands, only the first 8 event inputs of a DAP 103 are used as return information. The other 8 inputs can be assigned as required.

Table 2 Command Assignment Table

Commands	1-pole	1 1/2-pole	2-pole
Pulse commands	DAP 102 DAP 103 DAP 112	DAP 103	DAP 103
Persistent commands	DAP 102 DAP 103 DAP 112	DAP 103	DAP 103
Actively cancelled commands	DAP 102 DAP 103	DAP 103	DAP 103

4.2.16 Digital Setpoint Values

Projektierbar bei DAP 102, DAP 103, DAP 112

Zuordnung In Groups of 16 outputs each.

Verarbeitung No special processing. The 16-bit value is output on 16 outputs.

4.2.17 Analog Setpoint Values

Projektierbar bei DAU 104, DAU 108

Zuordnung The number of setpoint values is configured.

Verarbeitung No special processing. KOS 130/131 “shifts” from the left-justified SEAB-1F format to the right-justified format of the output module.

4.3 Configuration Limits

Table 3 Configuration Limits

Data type	Number	Structure
Monitored information	512	Bit
Real-time information	256	Bit
Counted measurand	64	Word
8-bit measurand	128	Byte
16-bit measurand	64	Word
Organization information	16	Bit
Commands	256	Bit
Digital setpoint value	32	Word
Analog setpoint value	32	Word
SD	40	Word
SU	2x40	Word
Real-time SU	40	Word

The specified numbers are single limits. The sum limits can be computed from system limits such as the capacity of the communications port SU/SD and the equipment conditions.

4.4 Special Features

- DEZ 160 and DAU 104 can only be used in the central subrack.
- Only one KOS 130/131 can be used per outstation.
- The clock antenna EM77.5 can only be used with DEZ 160 or KOS 130c/131c.
- If KOS 130/131 is equipped at slots 9 - 17, the parameter RAM is not buffered using the batteries of the ALU 131.
- ADU 115 can only be used as an ADU 116-compatible version. It is entered in the equipment list of the ALU 131 as ADU 116.
- The components DEA-H1/K1 cannot be configured for PRO → U130.
- There is no transient information in the usual sense. Instead, one uses real-time information without time-of-day notation. The exact time is set to FFFFH, telegrams of the approximate time are not transferred.

Chapter 5
Handling

This chapter describes design, parametrization and programming with PRO → U130.

It can be used as a reference manual for the project planner. Its structure adheres to that of the menu sequence.

5.1 General Information

The individual menu points are described in the order given below.

- Data input — Chapter 5.2
- Data archiving — Chapter 5.3
- IL generating — Chapter 5.4
- Transfer and start of Dolog AKF → A030/A130 — Chapter 5.5
- Printer output — Chapter 5.6
- Screen output of the bill of materials — Chapter 5.7

5.1.1 The Line Editor

The line editor is used for entering project data, commenting the data point list and extending the library file.

Table 4 Key Definitions (US keyboard)

Key	Definition
← (Backspace)	Delete character to left
<Del>	Delete character above cursor
<Ins>	Insert/overwrite switchover (is displayed at right of last screen line)
<Home>	Cursor to first character of input line
<End>	Cursor to last character of input line
<←>	Cursor one position to left
<→>	Cursor one position to right
< >↑	Cursor to start of previous input line
< >↓	Cursor to start of next input line
<Cr>	Terminate input
only for data point list, library and bill of materials	
<PgUp>	Previous page
<PgDn>	Next page
only for data point list	
<Alt>+<M>	Mark a line to copy
<Alt>+<A>	Mark line block, start
<Alt>+<E>	Mark line block, end
<Alt>+<C>	Copy marked line or line block to current cursor position

Since many computers have a US keyboard, the special German letters are assigned to function keys.

<Shift>+<F1> = Ä
<Shift>+<F2> = Ö
<Shift>+<F3> = Ü
<Shift>+<F4> = ä
<Shift>+<F5> = ö
<Shift>+<F6> = ü
<Shift>+<F7> = ß
<Shift>+<F8> = |
<Shift>+<F9> = ≤
<Shift>+<F10> = ≥

Additional columns in the column part of the data point list can be defined with <Shift>+<F8>.

☞ **Note** The complete character set can be edited with <Alt>+<ASCII-keyboard-code>. The number string may only be input with a number block.
The corresponding tables can be found in the user handbook of the PADT or in the printer handbook.

Example:
The letter Ä should be entered with the keyboard code. Press the Alt-key and then the digits 1, 4 and 2 one after the other. Then release the Alt key and the Ä appears on the screen.

5.1.2 Starting PRO → U130 E0 B1

PRO → U130 is started by the operating level with the “PRO-U130” call. A header containing the current version of the operating software appears once after the call. The main menu appears after you have pressed any key. You can then begin project planning.

PRO → U130 loads the last system and station processed into user memory after the call.

Caution The system “NONAME” and the station “UUST0” are set by the installation routine at the first start.

If the loaded station is still to be processed, you must decide whether the data model should be regenerated or only **extended**. Since only a maximum of 9 extensions are possible, the data model should be regenerated as long as it has not been transferred to a master station.

Caution Once the data model of an outstation has been accepted in a master station, one should only process with “extension” as otherwise the data model of the master station must also be changed.

Warning Extension means that data points may be added. Data points which already exist may not be changed or deleted as this results in chaos in the data model. It is only possible to delete or change in “restart” mode.

5.1.3 Autosave

Before leaving certain submenues, the data edited or generated there must be saved on the hard disk. This is true for the following menues:

- Data input
- Number of data points
- I/O module selection
- Measurand processing
- Data point list
- Edit library
- IL generating
- Screen output of the bill of materials

5.2 Data Input E1 B1

5.2.1 Project Data E2 B1

”Data input”,”Project data”
(F1→F1)

The date of the last time a station was processed is displayed. The operator cannot change this line.

System **E3 B1**
An input of a maximum of 8 characters is **required**. The system name is also the name of the subindex in which the data of the outstation are archived (see chap. 3.3). Therefore only characters which are permitted for index names under MS-DOS may be input.

Outstation, Comment, Operator
A maximum of 16 characters may be input. All characters which can be represented may be used. (see chap. 5.1.1)

This information specifies an outstation and is printed in a header in the documentation.

Outstation number
It is also called the outstation address or A-byte for the SEAB-1F. An outstation number between 0 and 126 **must** be entered. It is also used to identify the individual files during archiving (see chap. 3.3).

Note You can copy the set station by overwriting the system name or the outstation number. However, you must first save it with the “data archive” menu.

Example:
System “BEISPIEL” and outstation number “0” is loaded and should be copied to “BEISPIEL\UST5”.

Step 1 Overwrite outstation number (UST-Nr.) “0” with a “5”.

Step 2 Leave the menu with <F9> or <Esc>.

Step 3 Answer whether outstation should be copied with <J> <Cr>.

Step 4 Outstation is copied.

If you enter <N> <Cr> in step 3, the system “BEISPIEL” UST-Nr. “0” is not copied but “BEISPIEL\UST5” is opened as new the station.

☞ **Note** If the station “BEISPIEL\UST5” already exists, this is commented on the screen. You can now decide whether the archived data should be overwritten or loaded into user memory.

In the same manner, you can copy “BEISPIEL\UST0” to “TEST\UST3” by overwriting the system names and the UST-Nr.

You can then edit and extend the corresponding menues.

5.2.2 General Datas of Outstation E2 B1

"Data input","General Datas of Outstation"
(F1→F2)

The values set in this menu are valid for the **complete** outstation.

Command type **E3 B2**

You can select between 1-pole, 1 $^1/_2$-pole and 2-pole command output by toggling.

Note 1 $^1/_2$-pole and 2-pole command output is only possible with the DAP 103 because of the isolation. There are two isolated output groups of 8 outputs each per DAP 103.

For **1-pole** command output, a command from the master station controls one output of an output module.

For **1 $^1/_2$-pole** command output, a command from the master station controls two outputs. 8 commands always have one common group contact.

8 group contacts: The upper output group of the first DAP 103 contains the group contacts for the next 8 output groups. As a result, the 10th output group is again the group contact block for the next 9 output groups.

16 group contacts: The 16 group contacts for the following 16 output groups are assigned to the first DAP 103.

Note The position of the group contacts cannot be defined by the operator; they are automatically assigned.

For **2-pole** command output, a command from the master station controls one output of the upper and one output of the lower output group. Outputs 1 and 9, 2 and 10, 3 and 11 etc. thus each form a 2-pole command.

☞ **Note** If a group contact is defined as such but not required, it will be included for the users' own IL parts. This is only true for group contacts, but not for other output groups.

Cancel link time **E3 B2**

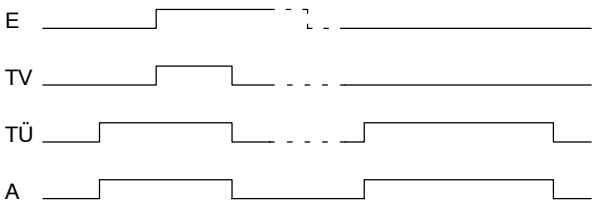
Range of settings: 100 msec to 99,9 sec
Standard setting: 200 msec

The arrival of return information starts the timer for the cancel link time. After expiration of this timer, the command output to be cancelled is reset.

Cancel supervise time **E3 B2**

Range of settings: 100 msec to 99,9 sec
Standard setting: 30 sec

As soon as a comand with active cancellation is output, the timer for the cancel supervise time is also started. If no return information arrives, the command output is reset after expiration of this timer and bit 2^6 is set in the organization information word.



E = Input return information
TV = cancel link time
TÜ = cancel supervice time
A = Command output

Figure 3 Time diagram for actively cancelled commands

Malposition suppression time **E3 B2**

Range of settings: 100 msec to 99,9 sec
Standard setting: 20 sec

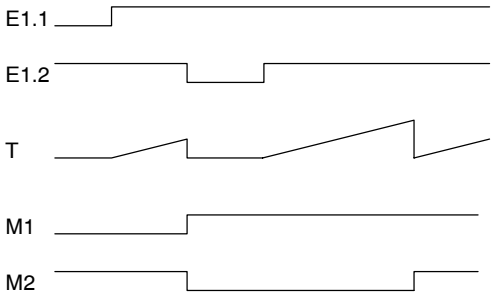
The transfer of the malposition for double-point information is suppressed for this length of time. If both information inputs have the same state, the timer for the malposition supervision time is started.

If another malposition occurs while the timer is running, the timer is reset and immediately started again. After expiration of the timer, the malposition is transferred to the KOS 130/131.

The timer is reset when the malposition is corrected, i.e. a message input changed its state. The change in information is immediately transferred to the KOS 130/131.

If several malpositions are present at the same time, the timer can only be reset by correcting the last malposition.

Caution Double-point information inputs which are not used should be alternately assigned level 0 und 1. Otherwise they are interpreted in the IL as a malposition and will constantly start the timer for the supervise time.



E1 und E2 = Double point information inputs
T = Malposition suppession time
M1 und M2 = Information status wich is transfered to master station

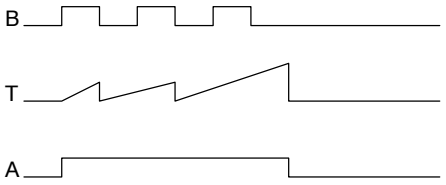
Figure 4 Time diagram for malposition suppression

Delay time for persistent commands **E3 B2**

Range of settings: 100 msec to 99,9 sec
Standard setting: 2 sec

This delay time defines the telegram runtimes between the outstation and the master station.

If a persistent command is sent by the master station, the timer for the delay time is started. If the same command arrives again while the timer is executing, the timer is reset and started again immediately. The command output is only reset after the timer has expired.



B = Command from master station
T = Delay time
A = Command output

Figure 5 Delay time for persistent commands

Reserved wrods in SU/SD: **E3 B2**

You can reserve “transport capacity” for virtual data or process data which you manage in your own IL part. The number of words to be reserved can be specified but not their position in SU/SD. The reservation is made after the first word required for internal control and status transport.

After your input has been terminated with <Cr>, the words which have been reserved are automatically displayed. A * next to SU means that the SU multiplexer is used because more than 40 words were reserved. (see chap. 4.1)

5.2.3 Number of Data Points E2 B1

”Data Input”,”Number of Data Points”
(F1→F3)

Input: E3 B3

If you input the number of individual data points, PRO → U130 automatically computes the required subracks and I/O modules.

You can rework or modify this “suggestion” in the “subrack selection” or “I/O module selection” menues.

☞ **Note** It is recommended that you alrady take this suggested sequence into consideration in the first system concept and not change it.

Input is decimal and must be terminated with <Cr>. The following upper limits are monitored:

- Maximum number of I/O modules
- Exceeding the SU/SD capacity
- Maximum number of data points for this data type

If one of these limits is exceeded, the corresponding comment appears on the screen and the input is not accepted.

The number of modules required and the reserve in the SU/SD is displayed at the lower edge of the screen.

☞ **Note** The following I/O modules can be selected for this function:
ADU 116
DAU 108
DEP 112
DAP 112

The subrack(s) are also equipped in the above order.

Since monitored information can only be assigned in groups of 8 and commands in groups of 16, these values are automatically rounded up when leaving the menu. Do not be surprised, therefore, if your definitions have been changed when you select this menu again.

PRO → U130 proceeds as follows when allocating data points to the I/O modules:

1. 8-bit measurands
2. 10-bit measurands
3. analog setpoint values
4. monitored information
5. double-point information
6. counted measurands
7. pulse commands
8. digital setpoint values

Caution If you made modifications or extensions using the menues "subrack selection" or "I/O module selection", you should not select this function again. PRO → U130 overwrites your entries with its "suggestion".

5.2.4 Selection of Subracks E2 B1

"Data Input","Selection of Subracks"
(F1→F4)

Selection: **E3 B4**

The selected subracks are displayed inversely. You can move the arrow to the left of the subracks with < > ↑ or < > ↓ The subrack to which the arrow points is marked with <Cr>.

The secondary subracks are optional and can be deleted with <Del>.

If an existing selection is “reduced”, any I/O modules which were planned are deleted.

If this is the case, a remark is output and you can annul your change.

When leaving the menu with <F9> or <Esc>, the selected subracks in the configuration of the station are entered.

5.2.5 Selection of Modules/Parameterization E2 B1

”Data input”,”Selection of Modules/Parameterization”
(F1→F5)

Selection: **E3 B5**
The subracks are represented graphically to correspond with the setting in the menu “Selection of Subracks” or with the initial values in the menu “Number of Data Points”.

The left side of the screen contains a list with the I/O modules, the communications processor module and the power supply modules.

If the subrack selection included a secondary subrack, the power supply modules are not offered for selection because the 2nd slot in the central subrack is automatically assigned to BIK 112.

The first slot in the central subrack is automatically assigned to the ALU 131 and the last slot to KOS 130/131.

The first slot of a secondary subrack is always equipped with DEA 106.

KOS 130/131 can be deleted at any time and be entered at any I/O slot location.

If a DTA 103 was selected as secondary subrack, the KOS 130/131 can also be entered in its last slot location which cannot be assigned to I/O modules.

Caution **If the KOS 130/131 is entered in the secondary subrack, its parameter RAM is not battery-buffered.**

The individual modules are selected with < >↑and < >↓and the subrack slot location with <← > and <→>. An arrow shows the current position.

The module which was set is entered in the subrack slot location with <Cr>.

There is a plausibility check whether this entry is permitted. If this is not the case, a remark is output and the entry is not made.

The module can be deleted from the marked slot location with <Del>.

Note Modules DEZ 160 and DAU 104can **only** be entered in the central subrack.
Modules ADU 115, ADU 116 and DAU 108 should be used in the central subrack. Otherwise greater IL runtimes must be expected because of the bit bus coupling.

ZOOM on/off **E4 B1**

”Data Input”,”Selection of Modules/Parameterization”,”ZOOM on/off” (F1→F5→F1)

Your data points can be assigned once the I/O modules have been allocated. Zooming, i.e. displaying an I/O module in enlarged form, can be applied here. The I/O module marked at the right in the subrack is displayed at the left of the image.

In order to display another subrack, the slot location in the subrack must only be swapped with <← > or <→>. You need not leave the “ZOOM” function.

The particular I/O module is displayed graphically in the window opened by the ZOOM function. The valid data point types are listed to their right. (see chap. 4.2)

These are:

- monitored information
- double-point information
- counted measurands
- 8-bit measurands
- 10-bit measurands
- actively cancelled commands
- persistent commands
- pulse commands with command runtime
- digital setpoint value output
- analog setpoint value output

The individual modules are displayed according to data groups.

Monitored information, counted measurands and measurands are assigned in groups of 8 inputs. Monitored information and counted measurands can be entered in groups of 8 mixed as required.

Commands and digital setpoint value output are assigned in groups of 16 outputs.

Analog setpoint values are assigned module-by-module.

- DEP 112 divided into 4 x 8
- DAP 102 divided into 1 x 16 and 2 x 8
- DAP 103 divided into 1 x 16 and 2 x 8
- DAP 112 divided into 2 x 16
- ADU 115 divided into in 2 x 8
- ADU 116 divided into in 2 x 8
- DAU 104 divided into 1 x 8 and 1 x 4
- DAU 108 divided into 1 x 8

The individual connection groups are selected with <Home> and <End>.
The data types are set with < >↑and < ↓.
The selected data type is entered in the defined connection group with <Cr>.

A data type which has been assigned can be deleted again with <Del>.

For pulse commands, a command runtime (command duration) per output group can be defined. The times may be between 100 msec and 99,9 sec. The standard setting is 300 msec. The runtimes for persistent commands and actively cancelled commands are asssigned in the menu “general outstation data”. (see chap. 5.2.2)

Connection groups of 8 inputs each are defined for counted measurands and measurands, but the number of inputs actually used must also be specified.

Setpoint value output is handled similarly.

The number or a command runtime must always be input if the last line is displayed inversely with the ? in the ZOOM window.

Caution When assigning counted measurands, measurands and analog setpoint value output, make sure that there are no gaps in the assignments.

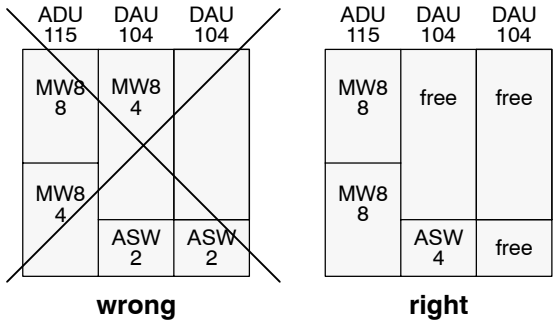


Figure 6 Data point allocation

You can process unused counted measurand inputs, measurand inputs and analog outputs in a separate IL part if required.

This is not true for monitored information input and command output since they are always processed by the “generated IL”.

The following upper limits are checked after each assignment:

- maximum number of data points per data type
- SU/SD capacity

If an upper limit is exceeded, a remark appears on the screen and the assignment is not made.

The reserve in SU/SD can be displayed at any time with the function key <F8>.

For 1 $^{1}/_{2}$-pole commands, the group contacts are assigned automatically when you leave the ZOOM function with <F9> or <Esc>. You can already activate this assignment within the ZOOM function by pressing the <G> key.

Special features:
The modules KOS 130/131 and DEZ 160 have a special status. No data points are assigned in the ZOOM function in this case; instead, the particular parametrization programs are called.

The call becomes active with <Cr>. If you do not want to call the parametrization program, move the arrow in the subrack one slot on.

The descriptions for these parametrization programs can be found in parts II and III.

You can also define here with <Home> or <End> whether a KOS 130 or a KOS 131 is to be used.

5.2.6 Measurand Processing E3 B6

”Data input”,”measurand processing”
(F1→F6)

All the measurands planned in the“I/O module selection” menu are listed. An upper and lower limit to be monitored and a hysterese can assigned to each one.

Limits from –1000 to +1000 are possible. The hysterese is specified as an absolute value between 0 and 1000 and is valid for both limits.

During IL generating, two virtual items of monitored information are assigned to each measurand to be monitored. One is assigned for the upper limit and one for the lower limit, even if only one limit is to be monitored. The virtual information is assigned to the measurands in the order in which they occur.

If “extension” mode was selected, limits which are entered later do not change the original order of the monitored information. The new information is appended. The virtual information for limit monitoring can be found starting with the SEAB subaddress 32 (20H).

During limit monitoring, all the measurands have the full range from –1000 to +1000. This range is later reduced to 0 to 255 for 8-bit measurands.

Therefore the following is valid for all measurands:

Scale end value = 1000 or –1000 = 100%

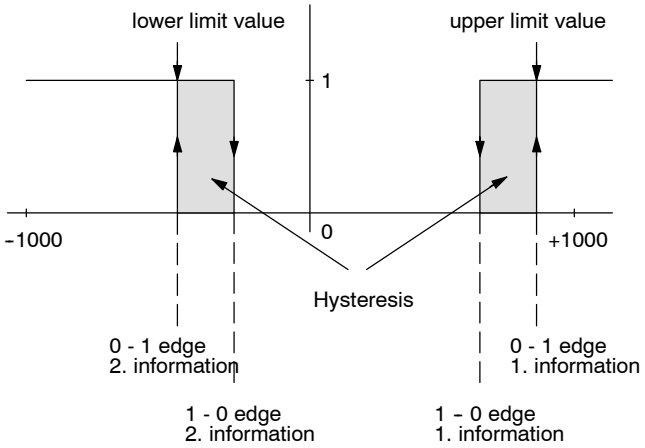


Figure 7 Limit monitoring of the measurands

Input of the limits:
The current input field is displayed inversely. You can skip to the next or previous input field (with line jump) with <Tab> and <Shift> + <Tab>.

You can skip to the next or previous input field of a line with <Ctrl> + <→> and <Ctrl> + <←>.

Otherwise the requirements of the line editor are valid.

If a value less than –1000 or greater than +1000 is input, a remark appears on the screen and the value must be corrected.

5.2.7 List of Data Points E3 B7

”Data input”,”List of Data Points”
(F1→F7)

The data point list contains a number of columns:

1. A-byte (Outstation number)
2. F-byte (Function byte)
3. A1-byte (Subaddress)
4. D1/D2-byte (Data bytes)
5. SU/SD-address
6. Data type
7. Module connection (corresponding to fill-in label)
8. Comments

Columns 6 and 7 are defined when the modules are planned and the data points are assigned.

☞ **Note** Columns 2-5 are computed from these two definitions during IL generating. Therefore it is of paramount importance that the IL be generated **before** the data point list is processed. This is also true if the design was extended or modified.

A maximum of 58 characters can be edited as a comment. This could be for example PV numbers or wiring remarks.

For space reasons, columns 1-5 are not displayed on the screen. The complete data point list can be output with the printer menu.

The line editor requirements are valid when editing.

It is possible to copy single lines or whole line blocks.

- You can mark the line containing the cursor for copying with <Alt> + <M>.
- A line block is marked as follows:
  Cursor to 1st line to be copied and <Alt> + <A>. Cursor to last line to be copied and <Alt> + <E>.
- The marked line or line block starting with the current cursor position is copied with <Alt> + <C>. The previous line contents are overwritten.

A line or line block can be copied with <Alt> + <C> until a new block or new line is marked.

Note Line blocks can only be marked within an I/O module and only be copied within an I/O module, i.e. not across module borders.

Correct:
Copy port 1.1 to 1.8 to port 1.16
Copy port 1.1 to 1.16 to port 2.8
Copy complete module 1 to port 4.1

Incorrect:
Copy port 1.1 to 1.16 to port 1.25
Copy complete module 1 to port 4.10

The copy is aborted as soon as the last port of an I/O module is reached.

5.2.8 Edit Library E3 B8

”Data Input”,”Edit Library”
(F1→F8)

All existing library files are listed alphabetically in a window. The arrow marking the selected library can be moved with < >↑ and < >↓ The lines are scrolled at the start and end of the window if more library files exist than can be displayed in the window.

When PRO → U130 is installed, a library (PRO.BIB) containing all the necessary hardware and software components for the U130 is provided. The individual components are listed together with their designation and part number.

You can copy this file to another one with <F1>. You will be asked to enter the file name of the new library. It can have a maximum of 8 characters. PRO → U130 appends the extension .BIB and thus identifies the file as a library file.

Caution Even if you created a new library with the copy function, you are still in the library you selected when entering this menu. If you want to process the new library, leave the menu with <F9> or <Esc> and select it again with <F8>. The new library will then be displayed for selection in the window.

You can delete all the libraries except the one you read in for processing with <F2>. You will be asked for the file name and the corresponding library is deleted when the input is terminated with <Cr>.

It makes sense to create several library files if PRO → U130 is also to be used as for calculating. You can then enter a price per item for each component in the last column and create several files with different customer rebates.

You can also store library files with a certain combination of components as standard files.

The individual libraries comprise 120 positions divided into three categories.

Positions 1 - 17 are the subracks and the modules, whose number is defined during project planning (see chap. 5.2.2, 5.2.4 and 5.2.5). Only the price per item in the last column can be edited here.

Positions 18 - 68 are hardware and software components for which you can define whether or not and how often they should be included in the bill of materials. This is done by entering the required number in the first column.

Positions 69 - 120 is at your disposition. You can enter for example special modules or the cost for installation and planning. The price per item entered here is used in the calculation and in the bill of materials.

If an entry was made in one of the lines 69 -120, it is treated like lines 18 - 68. Only the number and the price per item can be changed. The whole line can be deleted with <Del>, however, if the cursor is at the start of the line.

You can skip to the previous or next line with < > ↑ and < > ↓ if the cursor is at the start of the line.

You can skip to the first possible input position with <→>.

The line editor is valid within an input field.

From the column “number” one always skips first to the column “price per item”. One cannot skip directly to the column “price per item” after position 18. If you want to skip a column, simply press <Cr>.

5.3 Data Archive E1 B1

Read data E2 B3

”Data Archive”, “Read Data”
(F2→F1)

All the systems processed so far are listed alphabetically in a window. The arrow marking the selected system can be moved with < >↑and < >↓ The lines are scrolled at the beginning and end of the window if more systems exist than can be displayed in the window.

The selection is confirmed with <Cr> and the outstations of this system which have been processed so far are listed. The outstations are selected in the same manner as described above.

The outstation is loaded into user memory after the selection has been confirmed with <Cr>.

The windows can always be left with <Esc> or <F9> without loading a new station.

Save data E2 B2

”Data Archive”,”Save Data”
(F2→F2)

A station is saved on the drive currently set.

First a subindex is opened with the name of the system if it does not yet exist. All files generated so far are then saved in this subindex. (see also chap. 3.3)

Several stations can be saved on one diskette.

Delete file **E2 B2**

”Data Archive”,”Delete File”
(F2→F3)

As for “read data”, first all the systems so far processed and then all the outstations are listed in a window.

All the files belonging to an outstation are deleted if the selection of this outstation is confirmed with <Cr>.

Once all the outstations of a system have been deleted, the corresponding subindex is automatically deleted.

The delete function can be aborted with <Esc> or <F9>.

Change drive **E2 B2**

”Data Archive”,”Change Drive”
(F2→F4)

Drives A to D are displayed for selection in a window.

The initial value is the drive from which PRO → U130 was started. If this setting is changed e.g. from C to A, drive A is now accessed for the functions “read file”, “save file” and “delete file”.

5.4 IL Generation E1 B1

Start IL generation (German) E2 B5

"Generation of IL","Start IL generation (German)"
(F5→F1)

The generated blocks are saved in the file USTx.AWL. File USTx.AWL is opened for writing in mode APPEND. APPEND means that additional write operations are always appended to the current end of file.

The IL is generated as follows:

Step 1 Determine maximum number of data points

Step 2 Write macro file for function blocks in file USTx.AWL

Step 3 Set up organization block OB1

Step 4 Read in macro for SU multiplexer and set up program block PB1 for SU multiplexer and SU organization

Step 5 Read in timer macros and set up program blocks PB7 and PB10 for SD organization

Step 6 Read in macro for organization information and set up program block PB2

Step 7 Read in macro for processing monitored information and set up program block PB4

Step 8 Read in macro for processing double-point information and set up program block PB14

Step 9 Read in macro for processing the process state of the real-time information and set up program block PB21

Step 10 Read in macro for processing real-time information and set up program block PB22

Step 11 Read in macro for processing counted measurands and set up program block PB3

Step 12 Read in macro for processing counted measurands with DEZ 160 and set up program block PB23

Step 13 Read in macro for processing 8-bit measurands and set up program block PB5

Step 14 Read in macro for 10-bit measurands and set up program block PB6

Step 15 Read in macro for monitoring the measurand limits and set up program block PB15

Step 16 Read in macro for 1-of-n check of the commands and set up program block PB12

Step 17 Read in macro for “command output” and set up program block PB13

Step 18 Read in macro for “reset command output” and set up program block PB11

Step 19 Read in macro for persistent commands and set up program block PB24

Step 20 Read in macro for command cancel and set up program block PB19

Step 21 Generate program block PB18 for error message “command not cancelled”

Step 22 Generate program block PB20 for message “command was cancelled”

Step 23 Read in macro for digital setpoint value output and set up program block PB8

Step 24 Read in macro for analog setpoint value output and set up program block PB9

Step 25 Allocate subaddresses (A1 byte)

Step 26 Create file USTx.KOS

Steps 7 to 24 are of course only carried out if the relevant data type was planned.

The steps described above result in the following SU/SD allocations:

Table 5 SU/SD Assignment

SU	SD
Organization information	Organization command
Monitored information	Commands
Double-point information	Digital setpoint values
Real-time information	Analog set point values
Counted measurands	
Counted measurands from DEZ 160	
8-bit measurands	
10-bit measurands	

The processing of monitored information for 64 items of information will be used to explain how a program block is set up:

The macro file for processing monitored information is read in. 16 items of information are processed in one macro. The macro is copied to user memory of the PUTE depending on the number of items of monitored information. For 64 items of information this is 4 times.

The symbolic addresses x.y and z are then replaced with the actual addresses.

The symbolic address z is replaced with the contents of the SU buffer counter. The SU buffer counter is incremented by 1 after each assignment.

The port addresses are found in the file USTx.HW. First information with the extension index 0 is searched for. The search always starts with the first module. If an information group is found, the symbolic address x.y is replaced with the current port address. The search is continued until either all symbolic addresses have been replaced or the last module has been reached.

If you reach the last module and not all the symbolic addresses have been replaced, the search begins again with the first module. Information with the extension index 1 is now searched for, then with extension index 2, etc.

At the end, all the addresses have been replaced and the block is written to file USTx.AWL.

☞ **Note** During IL generating, you will be asked whether the information in SEAB-1F format should be sorted. SEAB-1F format means that the first information input is not in the least significant bit 2^0. Instead it is in the most significant bit 2^{15}. This corresponds to the D1-byte bit 2^7.

Start IL Generation (English)

”Generation of IL”,”Start IL-Generation (English)”
(F5→F2)

The German IL as described above is the basis for the English ASCII-IL. This IL is again translated into English, i.e. commands or operands which have a different name in English are replaced. In this way English macro files are not required.

5.5 Transfer and Start AKF130 E1 B1

The software Dolog AKF → A030/A130 requires a great amount of memory. If you have loaded storage-resident programs or operator interfaces, the remaining main memory may not be sufficient for Dolog AKF → A030/A130.

In this case the functions “transfer” and “start AKF130” cannot be executed.

Leave PRO → U130 and remove these program calls from “AUTOEXEC.BAT” or “CONFIG.SYS” and make a “warm restart” (<Ctrl> + <Alt> + <Del>).

Then start PRO → U130 again and select “transfer” or “start AKF130”.

Transfer **E2 B3**

”Transfer and Start AKF130”,”Transfer”
(F3→F1)

The IL generated by PRO → U130 is transferred to Dolog AKF → A030/A130.

First a system index is opened by PRO → U130 under the AKF-index and then an outstation index is opened underneath.

PRO → U130 sets up the equipment list and writes it in the outstation index.

The file USTx.AWL is then copied to the outstation index under the name PRO-AKF.

PRO → U130 then calls the program Dolog AKF → A030/A130. The parameter /FWT, which causes Dolog AKF → A030/A130 to read the file PRO-AKF, is transferred in this call.

The intermediate code files are generated and stored in the outstation index during reading.

Warning Before Dolog AKF → A030/A130 reads in the file PRO-AKF, *all* the block files are deleted from the outstation index. If you again transfer a station to Dolog AKF → A030/A130, remember that these are also deleted if you yourself created PB's or FB's. Therefore you must first save these blocks in another index or on diskette.

Start AKF130 **E2 B2**

"Transfer and Start AKF130","Start AKF130"
(F3→F2)

You can directly start Dolog AKF → A030/A130 from PRO → U130 with this call. All the Dolog AKF → A030/A130 functions can be executed (see Dolog AKF → A030/A130 user handbook).

If you use only the standard IL of PRO → U130 and do not require special IL blocks, you can restrict yourself to the following function calls:

- Load IL in the RAM of the ALU 131 and start

or

- Program IL on EPROM
- Print IL

Load IL in the RAM of the ALU 131 and start

Step 1 Set up connection between COM1 and PC*

Step 2 Select “load” in main menu and <Cr>

Step 3 Select “link program” and <Cr>

Step 4 Select “program to PC*” and <Cr>

Step 5 Select “online” in main menu and <Cr>

Step 6 Select “start PC*” and <Cr>

Step 7 Answer question if start really required with yes

☞ **Note** Note the display at the lower right of the screen. If the PC* is already in the scan, it must first be stopped. Select “online” and then “stop PC*” in the main menu.

Program IL on EPROM

Step 1 Set up connection between COM1 and EPS 2000

Step 2 Select “load” in main menu and <Cr>

Step 3 Select “EPROM processing” and <Cr>

Step 4 Select “create EPROM file” and <Cr>

Step 5 Select “station → EPROM file” and <Cr>

Step 6 Answer “Parameter transfer prohibit observed for FBs?” with yes

Step 7 Set separating voltage to 12 volt by toggling

Step 8 Select “start” and <Cr>

Step 9 Insert EPROM on ALU 131 after end of programming process.

☞ **Note** A special EPROM (part number 233 891) is used for the ALU 131. Therefore an adaptor socket (part number 243 216) must be used with the EPS 2000.

⚠ **Caution Set the jumpers of the ALU to EPROM operation and “automatic start”.**

Print IL

Step 1 Select “print” in the main menu and <Cr>

Step 2 Select “program protocol” and <Cr>

Step 3 Set the following parameters:

Output mode:	“AWL”
Symbols and comments:	“EIN”
Local cross reference list:	“AUS”
Title block:	“AUS”
Title block file:	“AUS”
Output unit:	“printer”
Block list:	“OB,PB,FB”

Step 4 Select “start print” and <Cr>

☞ **Note** The suitable printer drive must possibly first be set with the menu “set up”. The parameter settings specified above are only intended as a suggestion. Of course you can also select other settings. Further details about the settings of the paramters and the “set up” menu can be found in the Dolog AKF → A030/A130 user handbook.

5.6 Printer Output E1 B1

Each printed page contains a header text which contains:

- system name
- outstation identifier
- date of creation
- version index
- comments
- operator

Printout of the bill of materials E2 B4

”Printer Output”,”Bill of Materials”
(F4→F1)

The defined bill of materials is printed. If the prices were entered in the library, these are also printed as item price and total price.

Printout of the subrack E2 B4

”Printer Output”,”Hardware Configuration”
(F4→F2)

The selected subrack(s) including the equipment configuration are printed in graphic form. The I/O module slots are designated with 1 to 16 to correspond to their slot locations.

Printout of the Table of Measurand Limits E2 B4

”Printer Output”,”Table of Measurand Limits”
(F4→F3)

The table contains only the measurands whose limits are to be monitored.

The limits are printed sorted according to the slot locations of the measurands.

☞ **Note** Limits included later in “extension” mode are not sorted into the table. These are appended to the end of the table. In this way the order of the virtual information is maintained.

The table has two parts:

- **Monitored information data**
  SEAB telegram address
  SU address

- **Measurand data**
  Slot address
  Limit
  Hysterese

☞ **Note** The IL must be generated before the table of limits is printed since the virtual information is assigned here. (see chap. LEERER MERKER)

Printout of the List of Data Points

E2 B4

”Printer Output”,”List of Data Points”
(F4→F4)

The data point list is printed sorted according to I/O slot locations.

The module type is printed as a header

The data point list comprises the SEAB telegram address, the SU/SD address, the data type, the module port (location) and the comment edited in the menu “comment data point list”.

Telegrammaddress							
A Dez	F Hex	A1 Hex	Dn	SU/SD	Datatype	Slot	Comment / Wiring
					Supply	U	
					Supply	U	
1	8A	00	1.7	WM753	Mon. inf.	2.1	
1	8A	00	1.6	WM753	Mon. inf.	2.2	
1	8A	00	1.5	WM753	Mon. inf.	2.3	
1	8A	00	1.4	WM753	Mon. inf.	2.4	
1	8A	00	1.3	WM753	Mon. inf.	2.5	
1	8A	00	1.2	WM753	Mon. inf.	2.6	
1	8A	00	1.1	WM753	Mon. inf.	2.7	
1	8A	00	1.0	WM753	Mon. inf.	2.8	
					Common	M	
					Supply	U	
					Supply	U	
1	8A	00	2.7	WM753	Mon. inf.	2.9	
1	8A	00	2.6	WM753	Mon. inf.	2.10	
1	8A	00	2.5	WM753	Mon. inf.	2.11	
1	8A	00	2.4	WM753	Mon. inf.	2.12	
.	.	.	.	.	.	.	
.	.	.	.	.	.	.	
.	.	.	.	.	.	.	

Figure 8 Excerpt of the data point list

Printout of the General Datas of Outstation E2 B4

”Printer Output”,”General Datas of Outstation”
(F4→F5)

The following data are printed:

- command type
- output time of the pulse commands, listed according to slot address and connection group
- cancel link time
- cancel supervise time
- malposition suppression time
- delay time for persistent commands
- reservations in SU and SD

Printout of All Lists E2 B4

”Printer Output”,”All Lists”
(F4→F6)

All the lists which exist are printed.

Selection of Printer E2 B4

A printer output is only planned for PRO → U130 using the parallel standard interface LPT1. Output using the serial interface is not recommended since it is already used to connect the PC*, the EPROM programming panel and the mouse.

Expert If you want to use a printer with serial interface nevertheless, you can direct the output in the MS-DOS level using MODE commands before PRO → U130 is started. The necessary instructions can be found in the MS-DOS handbook.

Note IBM character set II must be set for the printers.

DRU 292/293 **E3 B9**

”Printer Output”,”Selection of Printer”,”DRU 292P/293P”
(F4→F7→F1)

DRU 292 = DIN A4 matrix printer

DRU 293 = DIN A3 matrix printer

Near Letter Quality (NLQ) can be switched on and off with <F5>.

DRU 120 **E3 B9**

”Printer Output”,”Selection of Printer”,”DRU 120P”
(F4→F7→F2)

DRU 120 = DIN A4 matrix printer

Near Letter Quality (NLQ) can be switched on and off with <F5>.

DRU 096 **E3 B9**

”Printer Output”,”Selection of Printer”,”DRU 96”
(F4→F7→F3)

DRU 096 = DIN A3 Ink printer

DRU 1200 **E3 B9**

”Printer Output”,”Selection of Printer”,”DRU 1200”
(F4→F7→F4)

DRU 1200 = DIN A4 Laser printer

Near Letter Quality E3 B9

”Printer output”,”Selection of Printer”,”Near Letter Quality”
(F4→F7→F5)

The near letter quality mode can be switched on for the matrix printers. The printer output is somewhat slower then.

Note The individual IL blocks are not printed under PRO → U130. The IL as generated by PRO → U130 has a special format and contains control characters which are eliminated again when read into Dolog AKF → A030/A130. The IL blocks should therefore be printed using the corresponding functions for Dolog AKF → A030/A130.

5.7 Display the Bill of Material on the Screen E1 B1

This function gives you a quick summary of the scope and price of a planned outstation. In order to compute the prices, the price per item for the individual components must have been entered in the menu “edit library”. You can work with different library files.

After entering into this menu, a window appears in which all existing libraries are listed alphabetically. The arrow marking the selected library can be moved with < >↑ and < >↓. The lines are scrolled at the beginning and end of the window if more libraries exist than can be displayed in the window.

The bill of materials is set up from the planned modules and subracks. The bill of materials also includes all the positions of the library for which a number of items was entered.

If a bill of materials was already defined for an outstation, the user is asked whether this should be displayed or whether a new bill of materials should be created.

Caution If a new bill of materials should be created, remember that it is always created using the current library.

Chapter 6
IL-Blocks and Macros

The individual IL blocks and the macros used to create them are described in this chapter.

6.1 Summary

Warning User-dependent PC* functions can be included in an IL created with PRO → U130 in accordance with the rules of Dolog AKF → A030/A130.
If the blocks generated by PRO → U130 are changed, no guarantee can be made that these changed blocks will function correctly.

The organization block is generated directly by PRO → U130. No macro file exists for it.

The final form of the function blocks is stored in the file FBS.MAC. They are only read and copied, but not changed, by PRO → U130.

The program blocks are divided into three categories:

- Block is generated directly by PRO → U130
- Block is generated using a macro file
- Block is generated partly by PRO → U130 and partly by a macro file

The blocks PB10, PB16, PB18 and PB20 belong to the first category.

The blocks PB3 - PB6, PB8, PB9, PB13, PB15, PB19, PB21, PB23 and PB24 belong to the second category.

The blocks PB1, PB2, PB7, PB12, PB14 and PB22 belong to the third category.

6.1.1 List of the IL Blocks

IL block	Meaning
OB1	Block organization
PB1	SU multiplexer and organization
PB2	Pre-definitions and module check
PB3	Call counted measurand processing
PB4	Call monitored information processing
PB5	8-bit measurand processing
PB6	10-bit measurand processing
PB7	SD organization, timer for commands
PB8	Digital setpoint value processing
PB9	Analog setpoint value processing
PB10	Call SD blocks
PB11	Delete SD buffer
PB12	Call check command 1-of-n
PB13	Output commands
PB14	Call double-point information processing
PB15	Call measurand limit monitoring
PB16	Set MB1 to 255 (FFH) if real-time information processing
PB17	not used
PB18	Set error message “command not cancelled”
PB19	Check if command will be cancelled
PB20	Set marker for “command is cancelled”
PB21	Call real-time information processing (process state)
PB22	Call real-time information processing (event buffer)
PB23	Counted measurand processing with DEZ 160
PB24	Check call for persistent command
FB1	Reload SU1
FB2	Reload SU with real-time information
FB3	Counted measurand processing
FB4	Information processing
FB5	8-bit measurand processing
FB6	Measurand limit monitoring
FB7	Reload SD
FB8	Check double-point information for malposition
FB9	Double-point information processing
FB10	Check 1-of-n command
FB11	Organization information processing
FB12	Reload SU2
FB13	Real-time information processing (process state)
FB14	Real-time information processing (event buffer)
FB15	DEZ 160 enable
FB16	Check persistent command and output 1-pole
FB17	Check persistent command and output 2-pole
FB18	Reset marker for SU multiplexer
FB19	Check and limit measurands to $\pm$1000

6.1.2 List of the Markers Used

Marker	Explanation
M1*	is always set to 0
M2*	is always set to 1
M3*	1 = SU1 was reloaded
M4*	1 = real-time information is present
M5*	1 = command executing
M6*	set timer for malposition
M7*	reset timer for malposition
M8*	output timer malposition
M9 - M24	shift for 8-bit measurands
M25 - M88*	edge detection for 64 counted measurands
M89*	edge detection for cancelled command
M90	1 = cancelled command; 0 = pulse command
M91	reset timer for cancelled commands
M92	error marker for cancelled commands
M93	code for DEZ 160 enable
M94	switched-on marker for link time for cancelled commands
M95*	1 = SU2 was reloaded
M735	acknowledgement bit SD
M736	acknowledgement bit SU
M737 - M1024	SU/SD interface
MB1*	enable byte DEZ 160
MB2*	pointer to failed I/O module
MB3*	pointer to failed I/O module
MB4	LOW - part of monitored information or 8-bit measurands
MB5	HIGH - part of monitored information or 8-bit measurands
MB6 - MB53*	marker for 48 double-point information byte malposition
MB54*	transfer byte for code of current double-point information
MB55*	marker which monitored information had last malposition
MB56 - MB57	auxiliary byte to divide double-point information into bytes
MB58 - MB59	auxiliary byte for word division
MB60*	count byte for real-time information from buffer

* The markers indicated in this way may under no circumstances be used in other blocks than those defined in
PRO → U130.

Marker			Explanation
MW1	-	MW40*	SU1 - buffer
MW41	-	MW80*	SU2 - buffer
MW81	-	MW120*	SD - buffer
MW121	-	MW160*	Real-time information buffer
MW161	-	MW163	Check command for cancellation
MW164			Transfer word for 10-bit measurand
MW165			Transfer word for TSW command output time
MW166			1-of-n check
MW167			Error counter for 1-of-n check
T1 - T6			SU/SD interface
T17*			Command output time
T18*			Malposition suppression time
T19*			Cancel link time
Z1 - Z16			SU/SD interface

* The markers indicated in this manner may under no circumstances be used in blocks other than those defined by
PRO → U130.

6.1.3 List of the Macro Files

Macro file	Meaning
ANSW.MAC	Process analog setpoint values
BEF1.MAC	1-of-n command check
BEF2.MAC	Output pulse command
BEF3.MAC	Reset pulse command
BEF4.MAC	Output 2-pole command
BEF5.MAC	Check if 2-pole command will be cancelled
BEF6.MAC	Block call for output and reset command
BEF7.MAC	Call to set error marker for command not cancelled
BEF8.MAC	Output 1 1/2 -pole command
BEF9.MAC	Reset cancelled command (header)
BEF10.MAC	Check if 1-pole command is cancelled
BEF11.MAC	1-of-n check of 2-pole pulse command
DAUERBEF.MAC	1-pole persistent command output
DAUERBE2.MAC	1 1/2 and 2-pole persistent command output
DISW.MAC	Process digital setpoint values
DOPPEL.MAC	Process double-point information with malposition suppression
ECHT.MAC	Process real-time information (process state)
ECHTPU.MAC	Process real-time information (event buffer)
FBS.MAC	Contains all function blocks
MELD.MAC	Process monitored information
MESSW8.MAC	8-bit measurand processing
MESS_GR.MAC	Measurand limit monitoring
MW16.MAC	10-bit measurand processing
SUMULTI.MAC	SU-multiplexer
T_STOER.MAC	Timer for malposition suppression
T_BEFAUS.MAC	Timer for command output time
VERKL.MAC	Timer for link time of cancelled commands
VERW.MAC	Organization information; check if module failed
ZAEHL.MAC	Counted measurand processing (pulse inputs)
ZW16.MAC	Processing of 16-bit counted measurands from DEZ 160

6.2 The Organization Block

Note The end-of-block instruction BE is always appended automatically by PRO → U130 after the last network. *** are the network delimiters.

```
01      : U     SM6
02      : BCC   PB16    Call: Set MB1 to 255 (FFH)
03      : BC    PB2     Call: Module check
04      : BC    PB1     Call: SU organization
05      : BC    PB7     Call: SD organization
        : ***
        : BE
```

Lines 1 and 2 are only generated if a DEZ 160 with real-time information is configured.

Line 3 is always generated.

Line 4 is only generated if data in the monitoring direction was configured.

Line 5 is only generated if data in the control direction was configured.

6.3 The Program Blocks

☞ **Note** The end-of-block instruction BE is automatically appended by PRO → U130 after the last network. *** are the network delimiters.

6.3.1 Program Block PB1

```
01    : BC    PB3     Call: measurand processing
      : ***
02    : BC    PB23    Call: 16-bit measurand processing
      : ***
03    : BC    PB4     Call: Monitored information processing
      : ***
04    : BC    PB5     Call: 8-bit measurand processing
      : ***
05    : BC    PB6     Call: 10-bit measurand processing
      : ***
06    : BC    PB15    Call: measurand limit monitoring
      : ***
07    : BC    PB14    Call: double-point information processing
      : ***
08    : BC    PB21    Call: real-time information processing
      : ***           (Process state)
09    : A     M93     Enable DEZ 160?
10    : BCC   PB22    Call: real-time information processing
11    : AN    M93     (Event buffer)
12    : =     M93
      : ***
```

```
13          : A       M3          SU1 already reloaded
14          : AN      M95         SU2 not yet reloaded
15          : A       M736        Acknowledgement bit SU
16          : BCC     FB12        Call: reload SU2 buffer
17  NAME: SU2NORM
          : ***
18          : AN      M3          SU1 not yet reloaded
19          : A       M736        Acknowledgement bit SU
20          : BCC     FB1         Call: reload SU1 buffer
21  NAME: SU1NORM
          : ***
22          : A       M3          SU1 reloaded
23          : A       M4          Real-time information from buffer exists
24          : A       M95         SU2 reloaded
25          : A       M736        Acknowledgement bit SU
26          : BCC     FB2         Call: reload real-time information SU
27  NAME: SUECHT
          : ***
28          : A       M3          SU1 reloaded
29          : A       M95         SU2 reloaded
30          : AN      M4          No real-time information from the buffer
31          : BCC     FB18        Call: reset SU-multiplexer marker
32  NAME: MULT-MER
          : ***
          : BE
```

Lines 1 to 17 are generated directly by PRO → U130. The individual processing calls are only generated if required. If, for example, no 8-bit measurands are configured, line 4 is omitted.

If the 2nd SU is not required because only up to 40 words are to be transmitted, lines 13 to 17 are replaced with the following instructions:

```
          : LD      K1
          : =       M95
          : ***
```

If the acknowledgement bit M736 is set to 1, this means that KOS 130/131 has “fetched” the last SU and the next buffer can be copied. After copying, the IL sets the acknowledgement bit to 0.

Lines 18 to 32 are read in as a macro. (SUMULTI.MAC)

6.3.2 Program Block PB2

```
01        : LD    V0      Always set marker 1 to 0
02        : =     M1
03        : LD    V1      Always set marker 2 to 1
04        : =     M2
          : ***
05        : LBB   M737    Load LOW part into 1st SU word
06        : A     K192    Delete 6 least significant bits
07        : TBB   M737
          : ***
08        : LD    V1      1 for 1st I/O module location in MB2
09        : =     MB2
10        : A     SM1.1   Module error
11        : BAB   FB11    Call: generate organization information
12 NAME: VERW.M
13        : ZEIG: MB2     Pass pointer to location 1
          : ***
14        : LD    V2      2 for 2nd I/O module location in MB2
15        : =     MB2
16        : A     SM2.1   Module error
17        : BCC   FB11    Call: generate organization information
18 NAME: VERW.M
19        : ZEIG: MB2     Pass pointer to location 2
          : ***
20        : LD    V0      Delete counter for failed I/O
21        : =     MB3     modules
          : ***
          : BE
```

Macro File VERW.MAC

```
* Organization information  Module failure
L Kx;
= MB2;
U SMx.1;
BAB FB11;
MB2;
*;
```

Lines 1 to 7, 20 and 21 are directly generated by PRO → U130.

Lines 8 to 19 were generated using the macro file. The macro is copied once for each module location assigned. The variables x are then replaced with the addresses of the slot locations.

6.3.3 Program Block PB3

```
01        : BC      FB3        Call: counted measurand processing
02 NAME: ZAEHLWER
03     EIN: I1.1                Pass counted measurand input to FB3
04     FLA: M25                 Marker for edge detection
05     OUT: MW4                 SU address in which the ZW is stored
          : ***
06        : BC      FB3
07 NAME: ZAEHLWER
08     EIN: I1.2
09     FLA: M26
10     OUT: MW5
          : ***
          : BE
```

Macro File ZAEHL.MAC

```
* Counted measurands
BA FB3;
Ex.y;
Mv;
MWz;
*;
```

The macro file is copied to correspond to the number of counted measurands. x.y are then replaced with the connection address. Variable v is replaced with the contents of the edge detection counter and the counter is incremented. Variable z is replaced with the contents of the SU counter and the counter is incremented.

6.3.4 Program Block PB4

```
01          : LBW    I1.1        Load inputs 1 to 16
02          : TBW    MB56        and save in MB56 and MB57
03          : LBW    I1.1        Load inputs 1 to 16
04          : TBW    MB58        and save in MB58 and MB59
05          : BC     FB4         Call: monitored information processing
06 NAME:    MELDUNG
07     INL: MB56                 Pass inputs 1 to 8 as LOW byte
08     INH: MB59                 Pass inputs 9 to 16 as HIGH byte
09 MWSU:    MW1                 SU address for this monitored information
            : ***
10          : LD     IWA2.2      Load inputs 17 to 32 of a DEZ 160
11          : TBW    MB56        and save in MB56 and MB57
12          : LD     V0          Load constant 0
13          : TBW    MB58        and save in MB58 and MB59
14          : BC     FB4         Call: monitored information processing
15 NAME:    MELDUNNG
16     INL: MB57                 Pass inputs 25 to 32 as LOW byte
17     INH: MB58                 Pass constant 0 as HIGH byte
18 MWSU:    MW2                 SU address for the monitored information
            : ***
            : BE
```

Macro File MELD.MAC

```
* 16 MELDUNGEN
LBW Ex.y;
TBW MB56;
LBW Ex.y;
TBW MB58;
BA FB4;
MBlh;
MBhl;
MWz;
*;
```

Monitored information is always assigned byte-by-byte. However, since the DEZ 160 can only read monitored information input in groups of 16 and not singly, the inputs are always loaded word-by-word. If PRO → U130 recognizes that the monitored information comes from a DEZ 160, the instruction LBW E is automatically replaced with the instruction L EWA. (line 10)

Since furthermore the 16 items of monitored information of a SEAB telegram can occur on two different modules, 2 times 16 inputs are always loaded and assigned to 4 marker bytes. (lines 1 to 4 and 10 to 13)

Depending on which inputs are to be assigned to the SU word, the marker bytes MB56 to MB59 are passsed to the function block. MB56 or MB57 are always assigned to the LOW byte and MB58 or MB59 are always assigned to the HIGH byte of the SU. MB56 and MB58 always contain the first 8 assigned inputs and MB57 and MB59 always contain the last 8 assigned inputs (lines 7, 8, 16 and 17).

If only 8 items of monitored information are left over at the end for a SU word, the 2nd instruction LBW E is replaced with the instruction L K0, so that the HIGH byte in the SU word is set to zero (line 12).

6.3.5 Program Block PB5

```
01        : BA      FB5          Call: 8-bit measurand processing
02 NAME: MESS8
03     INL: IWA1.1 Pass 1st measurand input as LOW byte
04     INH: IWA1.2 Pass 2nd measurand input as HIGH byte
05   INKE: M1                   Pass the value 0
06 MWSU: MW1                    Pass SU address
          : ***
07        : BA      FB5
08 NAME: MESS8
09     INL: IWA1.3 Pass 3rd measurand input as LOW byte
10     INH: IWA1.3 Pass 3rd measurand input as HIGH byte
11   INKE: M2                   Pass the value 1
13 MWSU: MW2                    Pass SU address
          : ***
          : BE
```

Macro File MESS8.MAC

```
* 8-bit measurands
BA FB5;
EWAx.y;
EWAx.y;
M1;
MWz;
*;
```

A SEAB telegram comprises two 8-bit measurands. For this reason, 2 measurand inputs are passed to function block 2 for processing. (lines 3, 4, 9 and 10)

If 2 measurand inputs exist, marker M1 is passed as a code. M1 is always set to 0. (line 5)

If only 1 measurand input exists, it is passed twice and PRO → U130 replaces the marker M1 with M2. M2 is always set to 1. (line 11)

The HIGH byte is set to 0 in the function block by passing the value 1.

6.3.6 Program Block PB6

```
01        : BA      FB19        Call: limit measurand to ± 1000
02 NAME: MESSW_16
03 MESS: IWA1.1 Pass 1st measurand input
04 MWSU: MW1                  Pass SU address
          : ***
05        : BA      FB19
06 NAME: MESSW_16
07 MESS: IWA1.2
08 MWSU: MW2
          : ***
          : BE
```

Macro File MW16.MAC

```
* 16-bit measurands
BA FB19;
EWAx.y;
MWz;
*;
```

The individual measurand inputs and the SU addresses are passed to the function block for further processing.

6.3.7 Program Block PB7

```
01    : A      M 0.735    Acknowledgement bit SD: 1 = new SD
02    : BCC PB 10         Call: SD processing
      : ***
03    : A      M90        1 = cancelled command executing
04    : BCC    PB19       Call: cancellation check
      : ***
05    : A      M 0.94     1 = return information arrived
06    : TS     T 0.19
07    : LD     K 2        Cancel link time basis 100 msec
08    : AN     M 0.5      0 = command is reset, reset timer
09    : R      T 0.19
10    : =      M 0.91     Cancel link time expired
      : ***
11    : A      M 0.5      1 = command executing
12    : TEP    T 0.17
13    : LD     TSW 0.17   Timer-setpoint value
14    : A      M 0.91     1 = cancel link time expired
15    : R      T 0.17     Reset timer
16    : =      M 0.5      0 = reset command
      : ***
17    : AN     M5         0 = command was reset
18    : A      M89        1 = command output in last IL scan
19    : A      M90        1 = cancelled command
20    : AN     M94        0 = command was not cancelled
21    : BCC    PB18       Call: set error marker
22    : A      M5         Edge detection command output
23    : =      M89
      : ***
24    : AN     M5         0 = command should be reset
25    : BCC    PB11       Call: delete SD memory
26    : AN     M5
27    : BCC    PB13       Call: output SD memory
      : ***
28    : LD     K 0        Reset acknowledgement bit SD
29    : =      M 0.735
      : ***
      : BE
```

Macro File VERKL.MAC

```
* Link time for cancelled commands
U M94;
SS T19;
L Kt;
UN M5;
R T19;
= M91;
*;
```

Macro File T_BEFAUS.MAC

```
* Timer for command output time
U M5;
SV T17;
L TSW17;
U M91;
R T17;
= M5;
*;
```

Macro File BEF6.MAC

```
* Call: output and reset command (output time )
UN M5;
BABPB11;
UN M5;
BABPB13;
*;
```

Macro File BEF7.MAC

```
* Error code for cancelled commands
UN M5;
U M89;
U M90;
UN M94;
BABPB18;
U M5;
= M89;
*;
```

Lines 1 to 4 are directly generated by PRO → U130. The macro VERKL.MAC is read in for lines 5 to 10. Variable t is replaced with the cancel link time.

Macros T_BEFAUS.MAC, BEF7.MAC and BEF6.MAC are read in for lines 11 to 27.

Lines 28 and 29 are again directly generated by PRO → U130.

☞ **Note** Lines 3 to 10 and 17 to 23 are only generated if actively cancelled commands are configured.

6.3.8 Program Block PB8

```
01      : LD     MW 0.84    Load word from SD buffer
02      : TBW    Q 4.17     and output binary coded at outputs 17 - 32
        : ***               of the 4th I/O module
03      : LD     MW 0.85    Load word from SD buffer
04      : TBW    Q 5.1      and output binary coded at outputs 1 - 16
        : ***               of the 5th I/O module
        : BE
```

Macro File DISW.MAC

```
* Digital setpoint values
L MWs;
TBWAx.y;
*;
```

Variable s is replaced with the contents of the SD buffer counter. The counter is then incremented. Variables x.y are replaced with the 1st of 16 outputs. The setpoint value is output here.

6.3.9 Program Block PB9

```
01      : LD    MW 0.86   Load word from SD buffer
02      : =     QWA 2.1   and output to analog output
        : ***
03      : LD    MW 0.87
04      : =     QWA 2.2
        : ***
        : BE
```

```
* Analog output
L MWs;
= AWAx.y;
*;
```

Variable s is replaced with the contents of the SD buffer counter. The counter is then incremented. Variables x.y are replaced with the address of the analog value output.

6.3.10 Program Block PB10

```
01      : BC    FB  7     Call: reload SD-buffer
02 NAME: SD-UMSP
        : ***
03      : BC    PB  8     Call: digital setpoint value output
        : ***
04      : BC    PB  9     Call: analog setpoint value output
        : ***
05      : AN    M 0.5     0 = at present no command output
06      : BCC   PB 12     Call: 1-of-n check for commands
        : ***
07      : BC    PB 24     Call: check for persistent commands
        : ***
        : BE
```

The whole block is directly generated by PRO → U130. Lines 3 to 7 are only generated if the corresponding data type is configured.

6.3.11 Program Block PB11

```
01      : LD    V 0       Reset command output marker
02      : =     M 0.5
03      : LD    V 0
04      : =     M 0.90
05      : LD    V 0
06      : =     M 0.91
07      : LD    V 0
08      : =     M 0.94
09      : LD    V 0       Reset the
10      : =     MW 0.167  error counter for 1-of-n
        : ***
11      : LD    V 0       Reset SD buffer
12      : =     MW 0.81   Commands 1 to 16
        : ***
13      : LD    V 0       Reset SD buffer
14      : =     MW 0.82   Commands 17 to 32
        : ***
        : BE
```

Macro File BEF9.MAC

```
* Reset cancelled command (header)
L K0;
= M5;
L K0;
= M90;
L K0;
= M91;
L K0;
= M94;
L K0;
= MW167;
*;
```

Macro File BEF3.MAC

```
* Reset SD buffer
L K0;
= MWs;
*;
```

Lines 1 to 10 are read from the macro file BEF9.MAC. The macro BEF3.MAC is copied once for each 16 commands. Variable s is replaced with the contents of the SD buffer counter and the counter is incremented by 1.

6.3.12 Program Block PB12

1-of-n command output check for 1-pole commands or 1 1/2-pole commands with 16 group contacts.

```
01        : LD     V 0          Set reset marker for command output timer
02        : =      M 0.91       to 0
          : ***
03        : LD     V 3          Load value for timer setpoint value (300 msec) in

04        : =      MW 0.165     transfer marker word
05        : LD     MW 0.81      Load commands 1 to 16 in transfer word
06        : =      MW 0.161
07        : BC     FB 10        Call: 1-of-n check
08 NAME: UP1AUSN
09  INPU: MW 0.161              Pass command word
10 OUTP: MW 0.167               Pass error counter for 1-of-n check
11  BEFT: MW 0.165              Pass timer setpoint value
12        : LD     MW 0.167     Load error counter
13        : GT     V 1          0 = no command, 1 = ok, >1 = error
14        : BCC    PB 11        Call: delete SD buffer
15        : LD     MW 0.167     Load error counter
16        : EQ     V 1          1 = ok,
17        : =      M 0.5        Set marker for command output
18        : NOP
19        : NOP
20        : NOP
21        : NOP
          : ***
```

```
22          : LD      K 300       Load value for timer setpoint value (30 sec) in
23          : =       MW 0.165    transfer word
24          : LD      MW 0.82     Load commands 17 - 32 in transfer word
25          : =       MW 0.161
26          : BC      FB 10       Call: 1-of-n check
27  NAME: UP1AUSN
28   INPU: MW 0.161
29  OUTP: MW 0.167
30   BEFT: MW 0.165
31          : LD      MW 0.167
32          : GT      V 1
33          : BCC     PB 11
34          : LD      MW 0.167
35          : EQ      V 1
36          : =       M 0.5
37          : LD      MW 0.161    Load transfer word for commands 17 - 32
38          : NE      K 0         Not equal to 0 = command entered
39          : O       M 0.90      or marker for cancelled command already
40          : =       M 0.90      set; enter result in M90
            : ***
41          : BC      PB 13       Call: output command
            : ***
            : BE
```

Macro File BEF1.MAC

```
* Check command 1-of-n
L Kt;
= MW165;
L MWs;
= MW161;
BA FB10;
MW 161;
MW167;
MW165;
L MW167;
GR K1;
BABPBbl;
L MW167;
G K1;
= M5;
L MW161;
UGL K0;
O M90;
= M90;
*;
```

Lines 1, 2 and 41 are directly generated by PRO → U130.

Lines 3 to 40 are generated by copying the macro file BEF1.MAC twice.

A pulse command or persistent command is processed in lines 3 to 21. Instructions 18 to 21 therefore are overwritten by NOPs because they are only required by actively cancelled commands.

Variable t is replaced by the output time configured for this command group (pulse command). The trailer time is entered for persistent commands and the cancel supervise time is entered for actively cancelled commands. Constants cannot be directly passed to the function blocks. Therefore the timer setpoint value must be loaded into a marker word (MW165).

Variable s is replaced with the contents of the SD counter, which is incremented after each allocation.

If the value of the marker word MW167 is equal to 0 after the function block FB10 has been processed, this means that no command is entered in the passed SD word.

The function block FB10 actually only carries out a 1-of-16 check. The individual bits 2^0 to 2^{15} are checked sequentially for 1. The error counter word MW167 is incremented each time it does not agree. Since the MW167 keeps its value and is passed each time FB10 is called, a 1-of-n check is automatically implemented.

The MW167 is only set to 0 if a command which is executing is reset. This prevents a second command sent by the master station in a correct telegram from being output during execution.

If an error occurs (MW167 greater than 1), the program block PB11, which deletes all the command words in the SD buffer, is called.

1-of-n command output check command for 2-pole commands or $1^1/_2$-pole commands with 8 group contacts

```
01        : LD     V 0          Set reset marker for command output timer
02        : =      M 0.91       time to 0
          : ***
03        : LD     MW81         Transport SD buffer word in bytes
04        : TBW    MB4          MB4 and MB5
05        : LD     V0           MB5 = Fade out HIGH byte
06        : =      MB5
07        : LBW    MB4          Load MB4 and MB5 as word and
08        : =      MW161        assign marker word MW161
09        : LD     V 30         Load value for timer setpoint value (3 sec) in
10        = MW 0.165             transfer marker word
11        : BC     FB 10        Call: 1-of-n check
12 NAME: 1UP1AUSN
13  INPU: MW 0.161              Pass command word
14 OUTP: MW 0.167               Pass error counter for 1-of-n check
15  BEFT: MW 0.165              Pass timer setpoint value
```

```
16        : Ld      MW 0.167   Load error counter
17        : GT      V 1        0 = no command, 1 = ok, >1 = error
18        : BCC     PB 11      Call: delete SD buffer
19        : LD      MW 0.167   Load error counter
20        : EQ      V 1        1 = ok,
21        : =       M 0.5      Set marker for command output
22        : NOP
23        : NOP
24        : NOP
25        : NOP
          : ***
26        : LD      MW81       Transport SD buffer word in bytes
27        : TBW     MB4        MB4 and MB5
28        : LD      V0         MB4 = fade out LOW byte
29        : =       MB4
30        : LBW     MB4        Load MB4 and MB5 as word and
31        : =       MW161      assign marker word MW161
32        : LD      V 300      Load value for timer setpoint value (30 sec) in
33        : =       MW 0.165   transfer word
34        : BC      FB 10
35 NAME: UP1AUSN
36  INPU: MW 0.161
37 OUTP: MW 0.167
38  BEFT: MW 0.165
39        : LD      MW 0.167
40        : GT      V 1
41        : BCC     PB 11
42        : LD      MW 0.167
43        : EQ      V 1
44        : =       M 0.5
45        : LD      MW 0.161   Load transfer word for commands 9 - 16
46        : NE      V 0        Not equal to 0 = enter command
47        : O       M 0.90     or marker for cancelled command already
48        : =       M 0.90     set; enter result in M90
          : ***
49        : BC      PB 13      Call: output command
          : ***
          : BE
```

Macro File BEF11.MAC

```
* 2-pole command output
L MWs;
TBWMB4;
L K0;
= MBlh;
LBWMB4;
= MW161;
L Kt;
= MW165;
BA FB10;
MW161;
MW167;
MW165;
L MW167;
GR K1;
BABPBbl;
L MW167;
G K1;
= M5;
L MW161;
UGL K0;
O M90;
= M90;
*;
```

Commands with different command output times or processing types can be contained in an SD-word with 2-pole commands and $1^1/_2$-pole commands with 8 group contacts.

The SD-word is assigned to marker bytes MB4 and MB5 and during generating the variable lh is replaced with the byte to be faded out.

Commands 1 to 8 are processed in the 2nd network (lines 3 to 25) as pulse commands or persistent commands with an execution time of 3 seconds.

Coommands 9 to 16 are processed in the 3rd network (lines 26 to 48) as actively cancelled commands with a cancel supervision time of 30 seconds.

6.3.13 Program Block PB13

The commands are output to the module outputs in program block PB13. Depending on the command type selected, it is generated using the macro files BEF2.MAC, BEF4.MAC or BEF8.MAC.

All command words from the SD buffer are output to the corresponding outputs. A check in PB12 ensures that more than one bit is never set. Therefore more than one command cannot be output, even if all the command words are output simultaneously.

This means: for 1-pole commands, 1 output is set to 1, for 1 1/2-pole and 2-pole commands 2 outputs are set to 1.

Output 1-pole commands

```
01      : LD     MW 0.81    Load word from SD buffer
02      : TBW    Q 4.1      and output to outputs 1 - 16 of the 4th I/O
        : ***               module
03      : LD     MW 0.82
04      : TBW    Q 4.17
        : ***
05      : LD     MW 0.83
06      : TBW    Q 5.1
        : ***
        : BE
```

Macro File BEF2.MAC

```
* Output command
L MWs;
TBWAx.y;
*;
```

Variable s is replaced with the contents of the SD buffer counter. The counter is then incremented. Variables x.y are replaced with the calculated module connections.

Output $1^1/_2$-pole commands

```
01      : LD     MW 0.81    Load word from SD buffer
02      : TBW    MB 4       Assign to MB4 and MB5
03      : LD     MB 4       Load the LOW byte and
04      : TBW    Q1.9       output to outputs 9 - 16
05      : LD     MB4        If the output byte is greater
06      : GT     V0         than 0,
07      : =      Q1.1       set corresponding group contact to 1
        : ***
08      : LD     MW 0.81    Load word from SD buffer
09      : TBW    MB 4       Assign to MB4 and MB5
10      : LD     MB 5       Load the HIGH byte and
11      : TBW    Q2.1       output to outputs 1 - 8
12      : LD     MB5
13      : GT     V0
14      : =      Q1.2
        : ***
15      : LD     MW 0.82    Load word from SD buffer
16      : TBW    MB 4       Assign to MB4 and MB5
17      : LD     MB 4       Load the LOW byte and
18      : TBW    Q2.9       output to outputs 9 - 16
19      : LD     MB5
20      : GT     V0
21      : =      Q1.3
        : ***
        : BE
```

Macro File BEF8.MAC

```
* Output 1.5-pole command
L MWs;
TBWMB4;
L MBlh;
TBBAx.y;
L MBlh;
GR K0;
= Ax.y;
*;
```

For $1^1/_2$-pole commands, output to the individual networks is bytewise since 8 commands are always assigned to a common group contact. Therefore the SD buffer word is assigned to two bytes. Variable lh is replaced alternately with 4 or 5 per network so that the LOW byte and the HIGH byte are each output once. Variables x.y are replaced with the calculated module connections and variable s is assigned the contents of the SD buffer counter. However, this time the counter is only incremented with every second assignment.

In the first network (lines 1 to 7), commands 1 to 8, which are contained in the LOW byte of the first SD buffer word, are processed.

The 2nd network (lines 8 to 14) processes commands 9 to 16 in the HIGH byte of the 1st SD buffer word.

The 3rd network (lines 15 to 21) processes commands 17 to 24 in the LOW byte of the 2nd SD buffer word.

Lines 5 to 7, 12 to 14 and 19 to 21 are used to check whether a bit is set in the corresponding output byte. If this is the case, i.e. the result is 1, this 1 is assigned to the output of the group contact.

Output 2-pole commands

```
01      : LD    MW 0.81     Load word from SD buffer
02      : TBW   MB 4        Assign to MB4 and MB5
03      : LD    MB 4        Load the LOW byte and
04      : TBW   Q1.1        output the outputs 1 - 8
05      : LD    MB 4        Load the LOW byte and
06      : TBB   Q1.9        output the outputs 9 - 16
        : ***
07      : LD    MW 0.81     Load word from SD buffer
08      : TBW   MB 4        Assign to MB4 and MB5
09      : LD    MB 5        Load the HIGH byte and
10      : TBW   Q2.1        output the outputs 1 - 8
11      : LD    MB 5        Load the HIGH byte and
12      : TBB   Q2.9        output the outputs 9 - 16
        : ***
```

```
13      : LD    MW 0.82     Load word from SD buffer
14      : TBW   MB 4        Assign to MB4 and MB5
15      : LD    MB 4        Load the LOW byte and
16      : TBW   Q3.1        output the outputs 1 - 8
17      : LD    MB 4        Load the LOW byte and
18      : TBB   Q3.9        output to outputs 9 - 16
        : ***
        : BE
```

Macro File BEF4.MAC

```
* Output 2-pole commands
L MWs;
TBWMB 0.4;
L MBlh;
TBBAx.y;
L MBlh;
TBBAx.y;
*;
```

Output to the individual networks is bytewise since 8 commands can always be output 2-pole per DAP 103. The SD buffer word is assigned to two bytes. In the individual networks, variable lh is alternately replaced with 4 (LOW byte) or 5 (HIGH byte). The corresponding byte is output in each network once at the upper and once at the lower 8 outputs. Variable s is replaced with the contents of the SD buffer counter. The counter is incremented after every second assignment.

6.3.14 Program Block PB14

```
01          : LD     V 0          Reset marker for malposition timer
02          : =      M 0.6        start
03          : LD     V 0          Reset marker for malposition timer
04          : =      M 0.7        stop
            : ***
05          : LBW    E 3.17       Load inputs 17 - 32 from DAP 112
06          : TBW    MB 0.56      Assign to MB56 and MB57
07          : LD     V 0          Load double-point information code in MB4
08          : =      MB 0.4
09          : BC     FB 8         Call: check malposition
10  NAME: DOPPELM
11        IN: MB 0.56             LOW byte = transfer inputs 17 - 24
12  DMNR: MB 0.6                 Transfer double-point information marker byte
13  DMMB: MB 0.4                 Transfer double-point information code
14          : LD     MB 0.6       If double-point information marker byte
15          : EQ     V 0          is equal to 0,
16          : O      M 0.8        or the timer has expired
17          : BCC    FB 9         then call: reload DM
18  NAME: DM-UMSP
19        IN: MB 0.56             Pass double-point information
20     INKE: M 0.1                M1 means: DM in LOW byte of SU word
21 MWSU: MW 0.1                   Transfer SU buffer word
22  MERK: MB 0.6                 Transfer double-point information marker byte
            : ***
23          : LD     IWA 6.1      Load inputs 1 - 16 from DEZ 160
24          : TBW    MB 0.56      Assign and MB56 and MB57
25          : LD     V 4
26          : =      MB 0.4
27          : BC     FB 8
28  NAME: DOPPELM
29        IN: MB 0.57             Transfer HIGH byte (input) 9 - 16
30  DMNR: MB 0.7
31  DMMB: MB 0.4
```

```
32          : LD      MB 0.7
33          : EQ      V 0
34          : O       M 0.8
35          : BCC     FB 9
36 NAME:    DM-UMSP
37      IN: MB 0.57                 Transfer double-point information
38   INKE: M 0.2                    M2 means: DM in HIGH part of SU word
39 MWSU: MW 0.1                     SU buffer word
40 MERK: MB 0.7
          : ***
41        : A       M 0.6           M6 = 1 starts the timer
42        : TS      T 0.18
43        : LD      V 200           Malposition suppression time x 100 msec
44        : A       M 0.7           M7 = 1 = timer reset
45        : R       T 0.18
46        : =       M 0.8           Output timer
47        : A       M 0.7           If timer reset = 1,
48        : O       M 0.8
49        : =       M 0.8           then the timer output is also timer output 1
          : ***
          : BE
```

Macro File DOPPEL.MAC

```
* Double-point information with malposition suppression
LBWEx.y;
TBWMB 0.56;
L K k;
= MB 0.4;
BA FB 8;
MB 0.lh;
MB 0.m;
MB 0.4;
L MB m;
G K 0;
O M 0.8;
BABFB 9;
MB 0.lh;
M t;
MW z;
MB m;
*;
```

Macro File T_STOER.MAC

```
* Timer for malposition suppression
U M6;
SS T18;
L Kt;
U M7;
R T18;
= M8;
U M7;
O M8;
= M8;
*;
BE ;
$;
```

The markers which start or stop the malposition timer are reset in lines 1 to 4. If a malposition is recognized, marker M6 is set to 1 and thus starts the timer in the last network. If the malposition no longer occurs, marker M7 is set to 1 and thus stops the timer in the lst network. If the timer has expired or stopped, the monitored information is entered in the SU buffer.

The monitored information is always loaded as one word and then divided into 2 bytes (MB56 and MB57). This is necessary because data can only be read wordwise from the DEZ 160. Either MB56 or MB57 is transferred to the function block, depending on whether the LOW or HIGH byte is to be processed.

Each byte contains 4 x 2 items of monitored information which are to be checked for malposition. Every second group has a code from 0 to n. The code for the first group within the information byte is passed to the function block. The first information byte contains groups 0, 1, 2 and 3, so that a 0 is transferred. The second information byte contains groups 4 to 8, so that the 4 is transferred, etc. The code is required to determine which malposition last started the timer, because the timer may only be reset when this malposition no longer exists.

In order to determine whether a malposition was recognized, a double-point information byte exists parallel to each monitored information byte. This is necessary so that the same malposition does not start the timer for the suppression time again in the next IL scan. A bit is reserved in this marker byte for each group of two. The corresponding bit is set as soon as a malposition is recognized.

After the function block FB8 has been called, there is a check whether the double-point information marker byte is 0. 0 means that no bit is set, i.e. there is no malposition. If this is the case or if the timer for the suppression time has expired (marker M8 = 1), the monitoerd information in the function block FB9 is reloaded.

The monitored information byte, the SU buffer word and the double-point information marker byte are transferred to the function block FB9. The marker byte is reset in the FB and the monitored information byte is entered in the SU word. If marker M1 is transferred to the FB, the monitored information is entered in the LOW byte of the SU word; if marker M2 is transferred, it is entered in the HIGH byte. M1 is always set to 0 and M2 is always set to 1.

Lines 1 to 4 are directly generated by PRO → U130. Lines 5 to 40 are generated using the macro DOPPEL.MAC and lines 41 to 49 using macro T_STOER.MAC. The command LBW E is replaced with the command L EWA if the double-point information comes from a DEZ 160. See line 23.

6.3.15 Program Block PB15

```
01          : LD     V 1000      Assign upper limit for marker word MW161
02          : =      MW 161
03          : LD     V 100       Assign hysterese for marker word MW162
04          : =      MW 162
05          : LD     V 1         Load value for 1st bit set in marker word
06          : =      MW 163      MW163
07          : BC     FB 6        Call: limit monitoring
08  NAME: GRENZW.
09  KENN: M 2                    Transfer code for upper limit
10   EING: IWA 5.1               measurand input
11  GREN: MW 161                 Transfer upper limit
12   HYST: MW 162                Transfer hysterese
13  MELD: MW 36                  Transfer SU word for virtual information
14     BIT: MW 163               Transfer information bit
            : ***
15          : LD     V -1000     Assign lower limit for marker word MW161
16          : =      MW 161
17          : LD     V 100
18          : =      MW162
19          : LD     V 2         Load value for 2nd bit set in marker word
20          : =      MW 163      MW163
21          : BC     FB 6
22  NAME: GRENZW.
23  KENN: M 1                    Code for lower limit
24   EING: IWA 5.1
25  GREN: MW 161
26   HYST: MW 162
27  MELD: MW 36
28     BIT: MW 163
            : ***
            : BE
```

Macro File MESS_GR.MAC

```
* Measurand limit monitoring
L K gr;
= MW 0.161;
L K hy;
= MW 0.162;
L K bit;
= MW 0.163;
BA FB6;
M 0.1;
EWA x.y;
MW 0.161;
MW 0.162;
MW z;
MW 0.163;
*;
```

The upper limit for the measurand EWA 5.1 is monitored in the first network. The lower limit for this measurand is monitored in the second network.

The constants for the limits, the hysterese and the information bit must be loaded in MW since it is not possible to transfer constants to FBs (lines 1 to 6 and 15 to 20).

Marker M1 is always set to 0 and marker M2 to 1 in PB2. These markers (target 9 and 23) tell the function block whether the upper or lower limit is to be monitored. M2 = upper limit, M1 = lower limit.

Virtual information for 8 measurands can be stored in one word of monitored information = 16 bits. One word of monitored information is required for the upper and one for the lower limit. The value of the monitored information bits to be set in the SU buffer word (lines 13 and 27) when the limit is reached is passed to the function block (lines 14 and 28). 1st bit = 2^0 = 1, 2nd bit = 2^1 = 2 etc.

6.3.16 Program Block PB16

```
01      : LD    K 255
02      : =     MB 0.1
        : ***
        : BE
```

The PB16 is directly generated by PRO → U130. It is only executed in the 1st IL scan and sets the enable byte for the DEZ 160 to 255 (FFH).

Real-time information is requested from the DEZ 160 by resetting the corresponding bits. DEZ 160 at location 1 = 1st bit, DEZ 160 at location 5 = 5th bit etc.

The real-time information may only be requested when the DEZ 160 has synchronized itself. The enable bit must be set to 255 (FFH) in the first IL scan because it is 0 after a cold restart.

6.3.17 Program Block PB18

```
01      : LD    K1
02      : =     M92
        : ***
        : BE
```

The block PB18 is called when a command to be cancelled has not had return information. The error marker for cancelled commands is set to 1 in PB18. The block is directly generated by PRO → U130.

6.3.18 Program Block PB19

Check command for cancellation for 1-pole commands and $1^1/_2$-pole commands with 16 group contacts

```
01      : LBW   Q 7.1       Load 16 outputs and
02      : =     MW 0.161    assign to MW161
03      : LBW   I 7.1       Load 16 inputs and
04      : =     MW 0.162    assign to MW162
05      : LD    MW 0.161    If result of logical UND
06      : A     MW 0.162    on outputs and inputs
07      : NE    V0          is not equal to NULL, then
08      : BCC   PB 20       call: command is cancelled
        : ***
        : BE
```

Macro File BEF10.MAC

```
* Check command for cancellation 1-pole
LBWAx.y;
= MW161;
LBWEx.y;
= MW162;
L MW161;
U MW162;
UGL K0;
BABPB 20;
*;
```

The 16 outputs and 16 inputs are assigned to two marker words and checked for agreement with a logical UND. If the result of the UND operation is greater than NULL, the return information has arrived and the command can be cancelled after expiration of the link time.

Check command for cancellation for 2-pole commands and $1^1/_2$-pole commands with 8 group contacts

```
01      : LBB    Q 1.9      Load 8 outputs and
02      : =      MB 56      assign to MB56
03      : LBB    I 1.9      Load 8 inputs and
04      : =      MB 57      assign to MB57
05      : LD     MB 56      If result of logical UND on
06      : A      MB 57      outputs and inputs is
07      : NE     K0         not equal to NULL, then
08      : BCC    PB 20      call: command is cancelled
        : ***
        : BE
```

Macro File BEF5.MAC

```
* Check command for cancellation 2-pole
LBBAx.y;
= MB56;
LBBEx.y;
= MB57;
L MB56;
U MB57;
UGL K0;
BABPB 20;
*;
```

The 8 outputs and 8 inputs are assigned to two marker bytes and checked for agreement with a logical UND. If the result of the UND operation is greater than NULL, the return information has arrived and the command can be cancelled after expiration of the link time.

Program Block PB20

```
01      : LD     K1
02      : =      M94
        : ***
        : BE
```

Block PB20 is directly generated by PRO-U130. It is called whenever the return information for an actively cancelled command arrives. The switched-on marker for the link time is set to 1 here.

6.3.19 Program Block PB21

```
01        : BC      FB 13       Call: Process the process state of the
03 NAME: EZM-PROZ               real-time information
03      IN: IWA 1.1             Transfer monitored information 1 - 16
05   INKE: M 0.1                Code for 16 items of real-time information
04 MWSU: MW1                    SU buffer address
          : ***
05        : BC      FB 13
06 NAME: EZM-PROZ
07      IN: IWA 1.2
07   INKE: M 0.2                Code for 8 items of real-time information
08 MWSU: MW2
          : ***
          : BE
```

Macro File ECHT.MAC

```
* Real-time information for process states
BA FB 13;
EWA x.y;
M 0.1;
MWz;
*;
```

The current process state of the inputs of a DEZ 160 is transferred to the input words EWA 1.1 (input 1 - 16) and EWA 1.2 (input 17 - 32). The input word to be processed and the SU buffer word are calculated and transferred to the function block FB13. Marker M1 is set as a code that both the LOW byte and the HIGH byte contain real-time information. If only the LOW byte contains real-time information, marker M2 is passed as code. The generator replaces the command M 0.1 with M 0.2.

6.3.20 Program Block PB22

```
01          : LD     V 0
02          : =      M 0.9        Set marker M9 to NULL
03          : LD     IWA 1.11     Load 1st status word EZM
04          : A      V 128        Check if bit 2^7 is set
05          : EQ     V 128
06          : =      M 0.10       Result in marker M10
07          : LD     MB 0.60      Load counter byte for EZM buffer,
08          : LT     V 11         and check whether the contents are less than 11
09          : =      M 0.11       Result in marker M11
10          : A      M 0.10       Real-time information present,
11          : A      M 0.11       Enough space in buffer
12          : BCC    FB 14        Call: EZM-processing
13  NAME: EZM-PU
14     IN1: IWA 1.11               Transfer status word
15     IN2: IWA 1.12               Transfer real-time information
16     IN3: IWA 1.13               Transfer exact time
17    ZBYT: MB 0.60                Transfer EZM buffer counter byte
18   MERK: M 0.2                   Transfer constant 1
19          : LD     IWA 1.14     Load 2nd status word EZM
20          : A      V 128        Check if bit 2^7 is set
21          : EQ     V 128
22          : A      M 0.9        M9 = 1 if 1st EZM was reloaded
23          : BCC    FB 14        Call: EZM processing
24  NAME: EZM-PU
25     IN2: IWA 1.14
26     IN2: IWA 1.15
27     IN3: IWA 1.16
28    ZBYT: MB 0.60
29   MERK: M 0.2
```

```
30          : LD      V 254       Set bit 2^0 to 0, set all other
31          : =       MB 0.56     bits to 1
32          : LD      IWA 1.11
33          : O       IWA 1.14
34          : A       V 128       If in the 1st and 2nd EZM-status words
35          : EQ      V 0         bit 2^7 is not set,
36          : AN      SM1.2       and the DEZ 160 is functioning properly,
37          : O       M 0.9       or if the EZM was reloaded,
38          : BCC     FB 15       then call: enable DEZ 160
39  NAME:   DEZ-FR
40   RSET:  MB 0.56               1st bit in MB56 = 0 for DEZ 160 at location 1
41    MB1:  MB 0.1                Enable byte DEZ 160
          : ***
42          : LD      MB60        If the counter byte is greater than NULL,
43          : GT      V0          i.e. EZM exists,
44          : =       M4          marker M4 is set to 1
45          : ***
46          : BE
```

Macro File ECHTPU.MAC

```
* Real-time information from the buffer
L K 0;
= M 0.9;
L EWA x.11;
U K 128;
G K 128;
= M 0.10;
L MB 0.60;
KL K 11;
= M 0.11;
U M 0.10;
U M 0.11;
BABFB 14;
EWA x.11;
EWA x.12;
EWA x.13;
MB 0.60;
M 0.2;
L EWA x.14;
U K 128;
G K 128;
U M 0.9;
BABFB 14;
EWA x.14;
EWA x.15;
EWA x.16;
MB 0.60;
M 0.2;
L K k;
= MB 0.56;
L EWA x.11;
O EWA x.14;
U K 128;
G K 0;
UN SMx.2;
O M 0.9;
BABFB 15;
MB 0.56;
MB 0.1;
*;
```

A maximum of 2 items of real-time information can be read from each DEZ 160 in one IL scan. The first EZM lies in the EWA x.12, the corresponding exact time in the EWA x.13 and the status word in EWA x.11. The second EZM lies in EWA x.15, the exact time in EWA x.16 and the status word in EWA x.14. Bit 2^7 in the status word shows whether an EZM exists or not in the subsequent word. If the bit is set, this means that the EZM exists. (lines 3 to 6 and 19 to 21)

A maximum of 13 EZM can be written in the buffer. The EZM-processing is only called if at least 2 EZM can be entered in the SU real-time buffer (lines 7-9). If this is not the case, the DEZ 160 is not enabled until the buffer is empty.

The 2nd EZM is only processed if the 1st EZM already is entered in the SD real-time buffer. This is true if the marker M9 = 1 (line 22).

If the EZM have been reloaded (M9 = 1) or if no EZM are present in this IL scan (bit 2^7 in both status words = 0), the DEZ 160 processed in this network are enabled.

The DEZ 160 are enabled by resetting the corresponding bits in the marker byte MB1. For DEZ 160 at location 1 the 1st bit, for DEZ 160 at location 2 the 2nd bit etc. (lines 30, 31 and 40).

The last network contains a check whether EZM are entered in the SU real-time buffer. If this is the case, the marker M4 is set to 1 (lines 42 to 44). Marker M4 informs the SU multiplexer that EZM exist and must be reloaded. This last network is directly generated by PRO → U130.

6.3.21 Program Block PB23

```
01        : LD     IWA 6.3
02        : =      MW 0.8
          : ***
03        : LD     IWA 6.4
04        : =      MW 0.9
          : ***
          : BE
```

Macro File ZW16.MAC

```
* 16-bit counted measurand from the DEZ 160
L EWAx.y;
= MWz;
*;
```

The counted measurands are read by the DEZ 160 starting with EWAX.3 and assigned to the SU buffer word. Variable x is replaced with the slot location of the module, Variable y is replaced with 3 to 16, depending on the number of configured counted measurands. Variable z is replaced with the contents of the SU buffer counter and the counter is then incremented.

6.3.22 Program Block PB24

Check whether persistent commands should still be output, for 1-pole commands and $1^1/_2$-pole commands with 16 group contacts.

```
01        : BC     FB 16
02 NAME: DAUERBE1
03 MWSD: MW 0.82
04   AUS: Q 5.17
          : ***
          : BE
```

Macro File DAUERBEF.MAC

```
* Check whether a persistent command should still be output
BA FB16;
MWs;
Ax.y;
*;
```

Variable s is replaced with the contents of the SD buffer counter and the counter is then incremented. Variables x.y are replaced with the calculated connection addresses. The buffer word and the module outputs are passed to function block FB 16 for checking.

Check whether persistent commands should still be output, for 2-pole commmands and 1 1/2-pole commands with 8 group contacts.

```
01          : LD      MW 81
02          : TBW     MB 4
03            BC      FB 16
04 NAME:    DAUERBE1
05 MWSD:    MW 0.82
06   AUS    Q 5.17
            : ***
            : BE
```

Macro File DAUERBE2.MAC

```
* Check whether 2-pole or 1 1/2-pole persistent command is still present
L MWs;
TBWMB4;
BA FB17;
MBlh;
Ax.y;
*;
```

The commands are checked here bytewise and not wordwise since commands from a SD buffer word are output divided into 2 modules. The buffer word is assigned to the marker bytes MB4 and MB5 in lines 1 and 2. Marker byte MB4 or MB5 is transferred to the function block, depending on whether the LOW byte or the HIGH byte is to be checked.

6.4 The Function Blocks

The function blocks are all in the macro file FBS.MAC. They contain no variables which must be replaced by the generator.

All the function blocks are written to the file USTx.AWL, whether or not they are required. This does not cause an unnecessarily large instruction list since only those blocks which are called are linked during PC* linkage with Dolog AKF → A030/A130.

6.4.1 Function Block FB1

```
NAME :SU1NORM
      : ***
      : LD     V 0        The two most significant bits
      : =      M 0.751    in the 1st SU word (organization information)
      : LD     V 0        are set to 00
      : =      M 0.752
      : LD     MW 0.1     The SU1 buffer from marker word
      : TBW    M 0.753    MW1 to MW40 is loaded into
      : LD     MW 0.2     SU memory
      : TBW    M 0.769
      : LD     MW 0.3
      : TBW    M 0.785
      : LD     MW 0.4
      : TBW    M 0.801
      : LD     MW 0.5
      : TBW    M 0.817
      : LD     MW 0.6
      : TBW    M 0.833
      : LD     MW 0.7
      : TBW    M 0.849
      : LD     MW 0.8
      : TBW    M 0.865
      : LD     MW 0.9
      : =      TAW 0.1
      : LD     MW 0.10
      : =      TAW 0.2
```

```
: LD    MW 0.11
: =     TAW 0.3
: LD    MW 0.12
: =     TAW 0.4
: LD    MW 0.13
: =     TAW 0.5
: LD    MW 0.14
: =     TAW 0.6
: LD    MW 0.15
: =     TAW 0.7
: LD    MW 0.16
: =     TAW 0.8
: LD    MW 0.17
: =     TAW 0.9
: LD    MW 0.18
: =     TAW 0.10
: LD    MW 0.19
: =     TAW 0.11
: LD    MW 0.20
: =     TAW 0.12
: LD    MW 0.21
: =     TAW 0.13
: LD    MW 0.22
: =     TAW 0.14
: LD    MW 0.23
: =     TAW 0.15
: LD    MW 0.24
: =     TAW 0.16
: LD    MW 0.25
: =     CAW 0.1
: LD    MW 0.26
: =     CAW 0.2
: LD    MW 0.27
: =     CAW 0.3
: LD    MW 0.28
: =     CAW 0.4
: LD    MW 0.29
: =     CAW 0.5
: LD    MW 0.30
: =     CAW 0.6
: LD    MW 0.31
```

```
: =     CAW 0.7
: LD    MW 0.32
: =     CAW 0.8
: LD    MW 0.33
: =     CAW 0.9
: LD    MW 0.34
: =     CAW 0.10
: LD    MW 0.35
: =     CAW 0.11
: LD    MW 0.36
: =     CAW 0.12
: LD    MW 0.37
: =     CAW 0.13
: LD    MW 0.38
: =     CAW 0.14
: LD    MW 0.39
: =     CAW 0.15
: LD    MW 0.40
: =     CAW 0.16
: ***
: LD    V 1         Set marker for SU1 reloaded
: =     M 0.3
: LD    V 0         Reset SU acknowledgement bit
: =     M 0.736
: ***
: A     M 0.92      Write marker for command not cancelled
: =     M 0.743     in bit 2^7 of the organization information
: LD    V 0         Reset marker
: =     M 0.92
: ***
: BE
```

6.4.2 Function Block FB2

```
NAME: SUECHT
      : ***
      : LD    V 1       The two most significant bits in
      : =     M 0.751   the 1st SU word (organization information)
      : LD    V 0       are set to 01
      : =     M 0.752
      : LD    MW 0.121  The real-time buffer time of
      : TBW   M 0.753   marker words MW121 to MW160 is
      : LD    MW 0.122  loaded into SU store
      : TBW   M 0.769
      : LD    MW 0.123
      : TBW   M 0.785
      : LD    MW 0.124
      : TBW   M 0.801
      : LD    MW 0.125
      : TBW   M 0.817
      : LD    MW 0.126
      : TBW   M 0.833
      : LD    MW 0.127
      : TBW   M 0.849
      : LD    MW 0.128
      : TBW   M 0.865
      : LD    MW 0.129
      : =     TAW 0.1
      : LD    MW 0.130
      : =     TAW 0.2
      : LD    MW 0.131
      : =     TAW 0.3
      : LD    MW 0.132
      : =     TAW 0.4
      : LD    MW 0.133
      : =     TAW 0.5
      : LD    MW 0.134
      : =     TAW 0.6
      : LD    MW 0.135
      : =     TAW 0.7
      : LD    MW 0.136
      : =     TAW 0.8
```

```
: LD    MW 0.137
: =     TAW 0.9
: LD    MW 0.138
: =     TAW 0.10
: LD    MW 0.139
: =     TAW 0.11
: LD    MW 0.140
: =     TAW 0.12
: LD    MW 0.141
: =     TAW 0.13
: LD    MW 0.142
: =     TAW 0.14
: LD    MW 0.143
: =     TAW 0.15
: LD    MW 0.144
: =     TAW 0.16
: LD    MW 0.145
: =     CAW 0.1
: LD    MW 0.146
: =     CAW 0.2
: LD    MW 0.147
: =     CAW 0.3
: LD    MW 0.148
: =     CAW 0.4
: LD    MW 0.149
: =     CAW 0.5
: LD    MW 0.150
: =     CAW 0.6
: LD    MW 0.151
: =     CAW 0.7
: LD    MW 0.152
: =     CAW 0.8
: LD    MW 0.153
: =     CAW 0.9
: LD    MW 0.154
: =     CAW 0.10
: LD    MW 0.155
: =     CAW 0.11
: LD    MW 0.156
: =     CAW 0.12
: LD    MW 0.157
```

```
      : =     CAW 0.13
      : LD    MW 0.158
      : =     CAW 0.14
      : LD    MW 0.159
      : =     CAW 0.15
      : LD    MW 0.160
      : =     CAW 0.16
      : ***                 All markers are normed since the real-time
      : LD    V 0           SU was the last one to be reloaded
      : =     M 0.3         Marker SU1 reloaded
      : LD    V 0
      : =     M 0.4         Marker EZM exists
      : LD    V 0
      : =     M 0.95        Marker SU2 reloaded
      : LD    V 0
      : =     M 0.736       Reset SU acknowledgement bit
      : LD    V 0
      : =     MB 0.60       Reset counter byte for EZM
      : ***
      : BE
```

6.4.3 Function Block FB3

```
NAME: ZAEHLWER
  BEZ: EIN              (I/Q/M/MB/MW/SM/SMB/SMW/T/C) (L/R) I   L
  BEZ: FLA              (I/Q/M/MB/MW/SM/SMB/SMW/T/C) (L/R) M   L
  BEZ: OUT              (I/Q/M/MB/MW/SM/SMB/SMW/T/C) (L/R) MW  R
     : ***
     : LD    =EIN       If pulse input now 1
     : AN    =FLA       and in last IL scan 0,
     : JF    =ENDE
     : LD    =OUT       then counted measurand word is incremented
     : ADD   V 1
     : =     =OUT
ENDE: NOP
     : LD    =EIN       Store state of pulse input
     : =     =FLA       in edge detection marker
     : ***
     : BE
```

6.4.4 Function Block FB4

```
NAME: MELDUNG
  BEZ: INLB              (I/Q/M/MB/MW/SM/SMB/SMW/T/C) (I/R)  MB  L
  BEZ: INHB              (I/Q/M/MB/MW/SM/SMB/SMW/T/C) (I/R)  MB  L
  BEZ: MWSU              (I/Q/M/MB/MW/SM/SMB/SMW/T/C) (I/R)  MW  R
     : ***
     : LD    =INLB       Load monitored information LOW
     : =     MB 0.4      byte in marker byte MB4
     : LD    =INHB       Load monitored information HIGH
     : =     MB 0.5      byte in marker byte MB5
     : LBW   MB 0.4      Load marker byte MB4 and MB5 as
     : =     =MWSU       word and store in SU buffer memory
     : ***
     : BE
```

6.4.5 Function Block FB5

```
NAME: MESS8
  BEZ: INLB              (I/Q/M/MB/MW/SM/SMB/SMW/T/C) (L/R)  MW  L
  BEZ: INHB              (I/Q/M/MB/MW/SM/SMB/SMW/T/C) (L/R)  MW  L
  BEZ: INKE              (I/Q/M/MB/MW/SM/SMB/SMW/T/C) (L/R)  M   L
  BEZ: MWSU              (I/Q/M/MB/MW/SM/SMB/SMW/T/C) (L/R)  MW  R
     : ***
     : LD    =INLB       Load 1st measurand for LOW byte
     : TBW   M 0.9       and transfer to bit string as of marker 9
     : LD    M 0.19      Load sign bit
     : JF    =OK1        If sign bit = 1 (negative MW),
     : LD    V 0         then measurand is set to NULL
     : TBW   M 0.9
OK1: LBB     M 0.11      The 8-bit measurand is loaded starting with
     : =     MB 0.4      3rd bit and stored in LOW byte
     : LD    =INKE       If code bit = 1, then only one
     : JF    =ZWEI       8-bit measurand was transferred
     : LD    V 0         and the HIGH byte is set to NULL
     : =     MB 0.5
     : JI    =UMJI       Jump to reload the measurands
```

```
ZWEI: LD     =INHB     Load 2nd measurand for HIGH byte
    : TBW    M 0.9     and transfer to bit string starting with marker M9
    : LD     M 0.19    Check sign
    : JF     =OK2
    : LD     V 0       If measurand negative, it is set to NULL
    : TBW    M 0.9
OK2: LBB     M 0.11    Load 8-bit measurand starting with 3rd bit
    : =      MB 0.5    and store in HIGH byte
UMSP: LBW    MB 0.4    Load LOW and HIGH byte as word
    : =      =MWSU     and store in SU buffer
    : ***
    : BE
```

6.4.6 Function Block FB6

```
NAME: GRENZW.
 BEZ: KENN                (I/Q/M/MB/MW/SM/SMB/SMW/T/C) (L/R) M  L
 BEZ: EINEQ               (I/Q/M/MB/MW/SM/SMB/SMW/T/C) (L/R) MW L
 BEZ: GREN                (I/Q/M/MB/MW/SM/SMB/SMW/T/C) (L/R) MW L
 BEZ: HYST                (I/Q/M/MB/MW/SM/SMB/SMW/T/C) (L/R) MW L
 BEZ: MELD                (I/Q/M/MB/MW/SM/SMB/SMW/T/C) (L/R) MW R
 BEZ: BIT                 (I/Q/M/MB/MW/SM/SMB/SMW/T/C) (L/R) MW R
    : ***
    : LD     =KENN     If code = 0, jump to
    : JF     =U-GR     process lower limits
    : LD     =EINEQ    Monitor upper limits:
    : GE     =GREN     Compare measurand with limit
    : JF     =LAB1     MW < GRW, jump to check hysterese
    : LD     =MELD     Limit reached, load monitored information word
    : O      =BIT      Set monitored information bit for
    : =      =MELD     limit exceeded
    : JI     =ENDE     Jump to end of block
LAB1: LD     =EINEQ    Check if measurand reached threshold
    : LE     =HYST     limit minus hysterese
    : JF     =ENDE     If no, jump to end of block
    : LD     =BIT      If yes, load monitored information bit of limit
    : X      V -1      and invert
    : =      =BIT
    : LD     =MELD     Reset monitored information bit
```

```
      : A     =BIT     limit exceeded
      : =     =MELD
      : JF    =ENDE    Jump to end of block
U-GR: LD      =EINEQ   Monitor lower limit:
      : LE    =GREN    Compare measurand with limit
      : JF    =LAB2    MW > GRW, jump to hysterese check
      : LD    =MELD    Limit reached, load monitored information word
      : O     =BIT     and set monitored information bit
      : =     =MELD    for limit exceeded
      : JI    =ENDE    Jump to end of block
LAB2: LD      =EINEQ   Check if measurand reached threshold
      : GE    =HYST    limit plus hysterese
      : JF    =ENDE    If no, jump to end of block
      : LD    =BIT     If yes, load monitored information bit of limit
      : X     V -1     and invert
      : =     =BIT
      : LD    =MELD    Reset monitored information bit
      : A     =BIT     for limit exceeded
      : =     =MELD
ENDE: ***
      : BE
```

6.4.7 Function Block FB7

```
NAME: SD-UMSP
      : ***
      : LBW   M 0.897   The SD store is loaded into
      : =     MW 0.81   the SD buffer of marker word
      : LBW   M 0.913   MW81 to MW120
      : =     MW 0.82
      : LBW   M 0.929
      : =     MW 0.83
      : LBW   M 0.945
      : =     MW 0.84
      : LBW   M 0.961
      : =     MW 0.85
      : LBW   M 0.977
      : =     MW 0.86
      : LBW   M 0.993
```

```
: =     MW 0.87
: LBW   M 0.1009
: =     MW 0.88
: LD    TSW 0.1
: =     MW 0.89
: LD    TSW 0.2
: =     MW 0.90
: LD    TSW 0.3
: =     MW 0.91
: LD    TSW 0.4
: =     MW 0.92
: LD    TSW 0.5
: =     MW 0.93
: LD    TSW 0.6
: =     MW 0.94
: LD    TSW 0.7
: =     MW 0.95
: LD    TSW 0.8
: =     MW 0.96
: LD    TSW 0.9
: =     MW 0.97
: LD    TSW 0.10
: =     MW 0.98
: LD    TSW 0.11
: =     MW 0.99
: LD    TSW 0.12
: =     MW 0.100
: LD    TSW 0.13
: =     MW 0.101
: LD    TSW 0.14
: =     MW 0.102
: LD    TSW 0.15
: =     MW 0.103
: LD    TSW 0.16
: =     MW 0.104
: LD    CSW 0.1
: =     MW 0.105
: LD    CSW 0.2
: =     MW 0.106
: LD    CSW 0.3
: =     MW 0.107
```

```
: LD      CSW 0.4
: =       MW 0.108
: LD      CSW 0.5
: =       MW 0.109
: LD      CSW 0.6
: =       MW 0.110
: LD      CSW 0.7
: =       MW 0.111
: LD      CSW 0.8
: =       MW 0.112
: LD      CSW 0.9
: =       MW 0.113
: LD      CSW 0.10
: =       MW 0.114
: LD      CSW 0.11
: =       MW 0.115
: LD      CSW 0.12
: =       MW 0.116
: LD      CSW 0.13
: =       MW 0.117
: LD      CSW 0.14
: =       MW 0.118
: LD      CSW 0.15
: =       MW 0.119
: LD      CSW 0.16
: =       MW 0.120
: ***
: BE
```

6.4.8 Function Block FB8

```
NAME: DOPPELM
 BEZ: IN                (I/Q/M/MB/MW/SM/SMB/SMW/T/C) (L/R) MB   L
 BEZ: DMNR              (I/Q/M/MB/MW/SM/SMB/SMW/T/C) (L/R) MB   R
 BEZ: DMMB              (I/Q/M/MB/MW/SM/SMB/SMW/T/C) (L/R) MB   R
    : ***
    : LD    =IN         Load 8 double-point information inputs
    : TBB   M 0.10      and copy to the bit string starting at marker M10
    : LD    =DMMB       Check 1st double-point information
    : ADD   V 1         For 1st double point information add constant 1
    : =     MB 0.54     to DMMB and store result in MB54
    : A     M 0.10      Check 1st and 2nd DP-input for inequality
    : X     M 0.11
    : JT    =ME11       No malposition, jump to label ME11
    : LD    =DMNR       If equal, check if malposition
    : A     V 1         already recognized
    : EQ    V 1         1st bit set = malposition recognized
    : JT    =ME2        Jump to 2nd malposition check
    : LD    V 1
    : =     M 0.6       Set input for malposition timer
    : LD    =DMNR
    : O     V 1         Set malposition in DMNR as recognized
    : =     =DMNR
    : LD    MB 0.54     Enter malposition code in marker word for
    : =     MB 0.55     last malposition which occurred
    : JI    =ENDE       Jump to end of block
ME11: LD    =DMNR
    : A     V 1         Was this malposition set in
    : EQ    V 1         the last IL scan
    : JF    =ME2        If no, check 2nd malposition
    : LD    =DMNR       If yes, delete malposition bit from DMNR
    : A     V 254
    : =     =DMNR
    : LD    MB 0.54     Was this malposition the last one to occur
    : EQ    MB 0.55
    : JF    =ME2        If no, check 2nd malposition
    : LD    V 1         If yes, set marker for malposition timer reset
    : =     M 0.7
    : LD    V 0         Delete marker byte for last malposition
```

```
      : =     MB 0.55
ME2:  LD      =DMMB     Check 2nd double-point information
      : ADD   V 2       Add constant 2 to DMMB for 2nd
      : =     MB 0.54   double-point information and store in MB54
      : A     M 0.12    Check inputs 3 and 4 for inequality
      : X     M 0.13
      : JT    =ME22     Further processing and checks
      : LD    =DMNR     in the same manner as for the
      : A     V 2       1st double-point information
      : EQ    V 2
      : JT    =ME3
      : LD    V 1
      : =     M 0.6
      : LD    =DMNR
      : O     V 2
      : =     =DMNR
      : LD    MB 0.54
      : =     MB 0.55
      : JI    =ENDE
ME22: LD      =DMNR
      : A     V 2
      : EQ    V 2
      : JF    =ME3
      : LD    =DMNR
      : A     V 253
      : =     =DMNR
      : LD    MB 0.54
      : EQ    MB 0.55
      : JF    =ME3
      : LD    V 1
      : =     M 0.7
      : LD    V 0
      : =     MB 0.55
ME3:  LD      =DMMB     Check 3rd double-point information
      : ADD   V 3       Add constant 3 to DMMB for 3rd
      : =     MB 0.54   double-point information and store result in MB54
      : A     M 0.14    Check inputs 5 and 6 for inequality
      : X     M 0.15
      : JT    =ME33     Further processing and checking
      : LD    =DMNR     in the same manner as for
      : A     V 4       1st double-point information
```

```
      : EQ    V 4
      : JT    =ME4
      : LD    V 1
      : =     M 0.6
      : LD    =DMNR
      : O     V 4
      : =     =DMNR
      : LD    MB 0.54
      : =     MB 0.55
     :JI      =ENDE
ME33: LD      =DMNR
      : A     V 4
      : EQ    V 4
      : JF    =ME4
      : LD    =DMNR
      : A     V 251
      : =     =DMNR
      : LD    MB 0.54
      : EQ    MB 0.55
      : JF    =ME4
      : LD    V 1
      : =     M 0.7
      : LD    V 0
      : =     MB 0.55
ME4:  LD      =DMMB   Check 4th double-point information
      : ADD   V 4     Add constant 4 to DMMB for 4th
      : =     MB 0.54 double-point information, store result in MB54
      : A     M 0.16  Check inputs 7 and 8 for inequality
      : X     M 0.17
      : JT    =ME44   Further processing and checking
      : LD    =DMNR   in the same manner as for
      : A     V 8     1st double-point information
      : EQ    V 8
      : JT    =ENDE
      : LD    V 1
      : =     M 0.6
      : LD    =DMNR
      : O     V 8
      : =     =DMNR
      : LD    MB 0.54
      : =     MB 0.55
```

```
      : JI      =ENDE
ME44: LD      =DMNR
      : V       V 8
      : EQ      V 8
      : JF      =ENDE
      : LD      =DMNR
      : A       V 247
      : =       =DMNR
      : LD      MB 0.54
      : EQ      MB 0.55
      : JF      =ENDE
      : LD      V 1
      : =       M 0.7
      : LD      V 0
      : =       MB 0.55
ENDE: ***
      : BE
```

☞ **Note** Each group of double-point information with 8 inputs has its own DMNR in which the first 4 bits are used as a marker for the malposition. 1 bit for malposition at inputs 1 and 2, 2 bits for malposition at inputs 3 and 4 etc. The 5th to 8th bits are not used.
The last malposition to occur is entered in marker byte MB55. The 4 possible malpositions in the 1st group of double-point information has the code 1 to 4, the next 4 malpositions in the 2nd group of double-point information the code 5 to 8 etc. The base (0, 4, 8 etc.) from which counting starts is always transferred in DMMB by the calling program block.

6.4.9 Function Block FB9

```
NAME: DM-UMSP
  BEZ: IN                    (I/Q/M/MB/MW/SM/SMB/SMW/T/C) (L/R) MB  L
  BEZ: INKE                  (I/Q/M/MB/MW/SM/SMB/SMW/T/C) (L/R) M   L
  BEZ: MWSU                  (I/Q/M/MB/MW/SM/SMB/SMW/T/C) (L/R) MW  R
  BEZ: MERK                  (I/Q/M/MB/MW/SM/SMB/SMW/T/C) (L/R) MB  R
     : ***
     : LD     V 0            The double-point information byte is transferred
     : =      =MERK          in MERK and set to NULL
     : LD     =MWSU          The SU buffer word is loaded
     : TBW    MB 0.4         and assigned to MB4 and MB5
     : A      =INKE          Code if LOW byte or HIGH byte
     : JT     =HIGH          If code = 1, reload HIGH byte
     : LD     =IN            If code = 0, store monitored information inputs in
     : =      MB 0.4         LOW byte
     : JI     =UMJI          Jump to reload
HIGH: LD      =IN            Store monitored information inputs in HIGH byte
     : =      MB 0.5
UMSP: LBW     MB 0.4         Load LOW and HIGH byte as word
     : =      =MWSU          and assign to SU buffer word
     : ***
     : BE
```

6.4.10 Function Block FB10

```
NAME: UP1AUSN
  BEZ: INPU                  (I/Q/M/MB/MW/SM/SMB/SMW/T/C) (L/R) MW  L
  BEZ: OUTP                  (I/Q/M/MB/MW/SM/SMB/SMW/T/C) (L/R) MW  R
  BEZ: BEFT                  (I/Q/M/MB/MW/SM/SMB/SMW/T/C) (L/R) MW  L
     : ***
     : LD     V 1            Set 1st bit to 1 and all other
     : =      MW 0.166       bits to 0 in marker word MW166
     : LD     =INPU          Compare transferred command word with
MW166
     : A      MW 0.166       using logical UND
     : EQ     V 0
     : JF     =LAB2          If they agree, jump to label LAB2
LAB1: LD      MW 0.166       Check if last bit in marker word MW166
```

```
        : EQ    V -32768    is already set
        : JT    =LAB3       If yes, jump to end of block
        : LD    MW 0.166    If no, set next bit in MW166
        : MULD  V 2
        : =     MW 0.166
        : LD    =INPU       Compare transferred command word with
MW166
        : A     MW 0.166    using logical AND
        : EQ    V 0         If they do not agree, jump to
        : JT    =LAB1       label LAB1 and check next bit
   LAB2: LD     =OUTP       Load error counter for 1-of-n and
        : ADD   V 1         add constant 1
        : =     =OUTP
        : LD    =BEFT       Assign transferred command runtime
        : =     TSW 0.17    to timer setpoint value 17
        : JI    =LAB1       Jump to label LAB1
   LAB3: ***
        : BE
```

6.4.11 Function Block FB11

```
  NAME: VERW.M
   BEZ: ZEIEQ               (I/Q/M/MB/MW/SM/SMB/SMW/T/C) (L/R) MB   L
        : ***
        : LBB   M 0.737     Enter the transferred slot address of
        : A     =ZEIEQ      the failed module binary coded
        : TBB   M 0.737     in 1st SU word of markers M737 to M752
        : LD    MB 0.3      Increment counter byte for
        : ADD   V 1         failed modules
        : =     MB 0.3
        : LD    MB 0.3      Load counter byte.
        : GT    V 1
        : JF    =ENDE       Counter byte = 1, jump to end of block
        : LD    V 1         Counter greater than 1,
        : =     M 0.742     set 6th bit in 1st SU word to 1
  ENDE: ***
        : BE
```

6.4.12 Function Block FB12

```
NAME: SU2NORM
      : ***
      : LD    K 0       Two most significant bits in
      : =     M 0.751   1st SU word (organization information)
      : LD    K 1       are set to 10.
      : =     M 0.752
      : LD    MW 0.41   SU2 buffer of marker words
      : TBW   M 0.753   MW41 to MW80 is copied to SU store
      : LD    MW 0.42
      : TBW   M 0.769
      : LD    MW 0.43
      : TBW   M 0.785
      : LD    MW 0.44
      : TBW   M 0.801
      : LD    MW 0.45
      : TBW   M 0.817
      : LD    MW 0.46
      : TBW   M 0.833
      : LD    MW 0.47
      : TBW   M 0.849
      : LD    MW 0.48
      : TBW   M 0.865
      : LD    MW 0.49
      : =     TAW 0.1
      : LD    MW 0.50
      : =     TAW 0.2
      : LD    MW 0.51
      : =     TAW 0.3
      : LD    MW 0.52
      : =     TAW 0.4
      : LD    MW 0.53
      : =     TAW 0.5
      : LD    MW 0.54
      : =     TAW 0.6
      : LD    MW 0.55
      : =     TAW 0.7
      : LD    MW 0.56
      : =     TAW 0.8
```

```
: LD    MW 0.57
: =     TAW 0.9
: LD    MW 0.58
: =     TAW 0.10
: LD    MW 0.59
: =     TAW 0.11
: LD    MW 0.60
: =     TAW 0.12
: LD    MW 0.61
: =     TAW 0.13
: LD    MW 0.62
: =     TAW 0.14
: LD    MW 0.63
: =     TAW 0.15
: LD    MW 0.64
: =     TAW 0.16
: LD    MW 0.65
: =     CAW 0.1
: LD    MW 0.66
: =     CAW 0.2
: LD    MW 0.67
: =     CAW 0.3
: LD    MW 0.68
: =     CAW 0.4
: LD    MW 0.69
: =     CAW 0.5
: LD    MW 0.70
: =     CAW 0.6
: LD    MW 0.71
: =     CAW 0.7
: LD    MW 0.72
: =     CAW 0.8
: LD    MW 0.73
: =     CAW 0.9
: LD    MW 0.74
: =     CAW 0.10
: LD    MW 0.75
: =     CAW 0.11
: LD    MW 0.76
: =     CAW 0.12
: LD    MW 0.77
```

```
: =     CAW 0.13
: LD    MW 0.78
: =     CAW 0.14
: LD    MW 0.79
: =     CAW 0.15
: LD    MW 0.80
: =     CAW 0.16
: ***
: LD    V 1         Set marker for SU2 reloaded
: =     M 0.95
: LD    V 0         Reset SU acknowledgement bit
: =     M 0.736
: ***
: BE
```

6.4.13 Function Block FB13

```
NAME: EZM-PROZ
 BEZ: IN                    (I/Q/M/MB/MW/SM/SMB/SMW/T/C) (L/R) MW  L
 BEZ: INKE                  (I/Q/M/MB/MW/SM/SMB/SMW/T/C) (L/R) M   L
 BEZ: MWSU                  (I/Q/M/MB/MW/SM/SMB/SMW/T/C) (L/R) MW  R
    : ***
    : LD    =IN     Assign the 16 passed inputs
    : TBW   MB 0.4  to marker bytes MB4 and MB5
    : LD    =INKE   If code = 0,
    : JF    =LAB1   then jump: reload both bytes.
    : LD    V 0     If code = 1, set HIGH byte to NULL
    : =     MB 0.5
LAB1: LBW   MB 0.4  Load LOW and HIGH byte as word
    : =     =MWSU   and assign to SU buffer word.
    : ***
    : BE
```

☞ **Note** If code 0 is transferred, this means that all 16 inputs are parametrized as real-time information. If code = 1, the 8 inputs in the HIGH byte were not parametrized as real-time information and therefore must be faded out.

6.4.14 Function Block FB14

```
NAME: EZM-PU
  BEZ: IN1                  (I/Q/M/MB/MW/SM/SMB/SMW/T/C) (L/R) MW  L
  BEZ: IN2                  (I/Q/M/MB/MW/SM/SMB/SMW/T/C) (L/R) MW  L
  BEZ: IN3                  (I/Q/M/MB/MW/SM/SMB/SMW/T/C) (L/R) MW  L
  BEZ: ZBYT                 (I/Q/M/MB/MW/SM/SMB/SMW/T/C) (L/R) MB  R
  BEZ: MERK                 (I/Q/M/MB/MW/SM/SMB/SMW/T/C) (L/R) M   R
     : ***
     : A     =MERK     Set marker M9 to contents of MERK
     : =     M 0.9
     : ***
     : LD    =ZBYT     Load buffer pointer
     : EQ    V 0
     : JF    =LAB1     Pointer > 0, jump to next group.
     : LD    =IN1      Pointer = 0, assign the 3 real-time information
     : =     MW 0.121  words to the first 3 real-time buffer words
     : LD    =IN2
     : =     MW 0.122
     : LD    =IN3
     : =     MW 0.123
     : LD    V 0       Set 4th real-time buffer word as
     : =     MW 0.124  end code to NULL
LAB1 ***
     : LD    =ZBYT
     : EQ    V 1
     : JF    =LAB2
     : LD    =IN1      Pointer = 1, assign real-time information
     : =     MW 0.124  to 4th to 6th buffer words
     : LD    =IN2
     : =     MW 0.125
     : LD    =IN3
     : =     MW 0.126
     : LD    V 0
     : =     MW 0.127  Set end code
LAB2: ***
     : LD    =ZBYT
     : EQ    V 2
     : JF    =LAB3
     : LD    =IN1      Pointer = 2, assign real-time information
```

```
        : =     MW 0.127    to 7th to 9th buffer words
        : LD    =IN2
        : =     MW 0.128
        : LD    =IN3
        : =     MW 0.129
        : LD    V 0
        : =     MW 0.130    Set end code
LAB3: ***
        : LD    =ZBYT
        : EQ    V 3
        : JF    =LAB4
        : LD    =IN1        Pointer = 3, assign real-time information
        : =     MW 0.130    to 10th to 12th buffer words
        : LD    =IN2
        : =     MW 0.131
        : LD    =IN3
        : =     MW 0.132
        : LD    V 0
        : =     MW 0.133    Set end code
LAB4: ***
        : LD    =ZBYT
        : EQ    V 4
        : JF    =LAB5
        : LD    =IN1        Pointer = 4, assign real-time information
        : =     MW 0.133    to 13th to 15th buffer words
        : LD    =IN2
        : =     MW 0.134
        : LD    =IN3
        : =     MW 0.135
        : LD    V 0
        : =     MW 0.136    Set end code
LAB5: ***
        : LD    =ZBYT
        : EQ    V 5
        : JF    =LAB6
        : LD    =IN1        Pointer = 5, assign real-time information
        : =     MW 0.136    to 16th to 18th buffer words
        : LD    =IN2
        : =     MW 0.137
        : LD    =IN3
        : =     MW 0.138
```

```
      : LD     V 0
      : =      MW 0.139   Set end code
LAB6: ***
      : LD     =ZBYT
      : EQ     V 6
      : JF     =LAB7
      : LD     =IN1       Pointer = 6, assign real-time information
      : =      MW 0.139   to 19th to 21st buffer words
      : LD     =IN2
      : =      MW 0.140
      : LD     =IN3
      : =      MW 0.141
      : LD     V 0
      : =      MW 0.142   Set end code
LAB7: ***
      : LD     =ZBYT
      : EQ     V 7
      : JF     =LAB8
      : LD     =IN1       Pointer = 7, assign real-time information
      : =      MW 0.142   to 22nd to 24th buffer words
      : LD     =IN2
      : =      MW 0.143
      : LD     =IN3
      : =      MW 0.144
      : LD     V 0
      : =      MW 0.145   Set end code
LAB8: ***
      : LD     =ZBYT
      : EQ     V 8
      : JF     =LAB9
      : LD     =IN1       Pointer = 8, assign real-time information
      : =      MW 0.145   to 25th to 26th buffer words
      : LD     =IN2
      : =      MW 0.146
      : LD     =IN3
      : =      MW 0.147
      : LD     K 0
      : =      MW 0.148   Set end code
LAB9: ***
      : LD     =ZBYT
      : EQ     V 9
```

```
      : JF     =LA10
      : LD     =IN1        Pointer = 9, assign real-time information
      : =      MW 0.148    to 27th to 29th buffer words
      : LD     =IN2
      : =      MW 0.149
      : LD     =IN3
      : =      MW 0.150
      : LD     V 0
      : =      MW 0.151    Set end code
LA10: ***
      : LD     =ZBYT
      : EQ     V 10
      : JF     =LA11
      : LD     =IN1        Pointer = 10, assign real-time information
      : =      MW 0.151    to 30th to 32nd buffer words
      : LD     =IN2
      : =      MW 0.152
      : LD     =IN3
      : =      MW 0.153
      : LD     V 0
      : =      MW 0.154    Set end code
LA11: ***
      : LD     =ZBYT
      : EQ     V 11
      : JF     =ENDE
      : LD     =IN1        Pointer = 11, assign real-time information
      : =      MW 0.154    to 33rd to 35th buffer words
      : LD     =IN2
      : =      MW 0.155
      : LD     =IN3
      : =      MW 0.156
      : LD     V 0
      : =      MW 0.157    Set end code
ENDE: ***
      : LD     =ZBYT       Increment buffer pointer
      : ADD    V 1
      : =      =ZBYT
      : ***
      : BE
```

6.4.15 Function Block FB15

```
NAME: DEZ-FR
  BEZ: RSET              (I/Q/M/MB/MW/SM/SMB/SMW/T/C) (L/R) MB   L
  BEZ: MB1               (I/Q/M/MB/MW/SM/SMB/SMW/T/C) (L/R) MB   R
     : ***
     : LD     =RSET      Load transferred bit string
     : A      =MB1       Logical UND with marker byte MB1
     : =      =MB1       Assign result to MB1 again
     : ***
     : BE
```

6.4.16 Function Block FB16

```
NAME: DAUERBE1
  BEZ: MWSD              (I/Q/M/MB/MW/SM/SMB/SMW/T/C) (L/R) MW   L
  BEZ: AUS               (I/Q/M/MB/MW/SM/SMB/SMW/T/C) (L/R) M    L
     : ***
     : LBW    =AUS       Load 16 outputs
     : EQ     V 0        If all outputs are NULL
     : JT     =ENDE      jump to end of block.
     : LBW    =AUS
     : EQ     =MWSD      If outputs and command word are not
     : JF     =ENDE      identical, jump to end of block.
     : LD     V 0        If equal, the actual timer value
     : =      TAW 0.17   is set to NULL, the time scan begins again
ENDE: ***
     : BE
```

6.4.17 Function Block FB17

```
NAME: DAUERBE2
  BEZ: MWSD              (I/Q/M/MB/MW/SM/SMB/SMW/T/C) (L/R) MB   L
  BEZ: AUS               (I/Q/M/MB/MW/SM/SMB/SMW/T/C) (L/R) M    L
     : ***
     : LBB   =AUS        Load 8 outputs
     : EQ    V 0         If all outputs are NULL
     : JT    =ENDE       jump to end of block.
     : LBB   =AUS
     : EQ    =MWSD       If outputs and command byte are not
     : JF    =ENDE       identical, jump to end of block.
     : LD    V 0         If equal, the actual timer value
     : =     TAW 0.17    is set to NULL, the time scan begins again
ENDE: ***
     : BE
```

6.4.18 Function Block FB18

```
NAME: MULT-MER
     : ***
     : LD    V 0
     : =     M 0.3       Reset marker SU1 for reloaded
     : LD    V 0
     : =     M 0.95      Reset marker SU2 for reloaded
     : ***
     : BE
```

6.4.19 Function Block FB19

```
NAME: MESSW_16
  BEZ: MESS              (I/Q/M/MB/MW/SM/SMB/SMW/T/X) (L/R) MW  L
  BEZ: MWSU              (I/Q/M/MB/MW/SM/SMB/SMW/T/C) (L/R) MW  R
     : ***
     : LD     =MESS      Assign transferred measurand to
     : =      MW 0.164   marker word MW164.
     : LD     =MESS
     : GT     V 1000     Check if measurand is greater than 1000
     : JF     =NEEQ      If no, check negative measurand
     : LD     V 1000     If yes, limit measurand to 1000
     : =      MW 0.164
 NEG: LD      =MESS
     : LT     V -1000    Check if measurand is less than -1000
     : JF     =UMJI      If no, jump to reload measurand
     : LD     V -1000    If yes, limit measurand to -1000
     : =      MW 0.164
UMSP: LD      MW 0.164   Write measurand to SU buffer
     : =      =MWSU
     : ***
     : BE
```

Part II
DEZ 160 - Parameterization

Chapter 1
General Information

You can start the DEZ160 parametrization software directly from the operating system level (call: C:\PRO-U130\DEZ160P) or call it from PRO → U130.

Note when calling from PRO → U130:

The data are automatically saved on the hard disk and transferred to the PRO → U130 main program when you leave the DEZ parametrization. Therefore the “archive” menu is not provided for selection in a call from PRO → U130.

You can only set whether or not the DCF 775 real-time receiver should be connected in the “General Parameters” menu. PRO → U130 defines all other values and these cannot be changed.

Chapter 2
Handling

2.1 Main Menu E5 B2

You can call the following functions from the main menu:

- <F1> Data Input
- <F2> Data Archive
- <F3> EPROM Menu
- <F4> Printer Output
- <F8> Switch Monochrome/color

2.2 Data Input E6 B6

General Parameters E7 B7

”Data Input”,”General Parameters”
(F1 → F1)

The date when a DEZ 160 was last processed is displayed. The user cannot change this display.

System A maximum of 8 characters may be input. The system name is also the name of the subindex in which the data of the DEZ 160 are archived. Therefore only characters which are also valid for index names under MS-DOS may be input.

Outstation Comments Operator The input may have a maximum length of 16 characters but is not compulsory. All characters which can be represented may be input. This is printed in the documentation as a header.

Type of Module The DEZ 160 can also be driven like a DEP 112. The module can be set here by toggling. If the DEZ 160 is also parametrized as a DEZ 160, the inputs are addressed as 16-bit words (IWA x.1 to IWA x.16) in the instruction list. The inputs are addressed as bits (I x.1 to I x.32) in DEP 112 mode.

Slot The slot address with which the DEZ 160 is addressed in the instruction list must be entered here. The firmware checks whether the DEZ 160 is inserted in the correct slot of the subrack using this address. If this is not so, a DEZ 160 failure is reported. This is necessary because it would have serious consequences if for example a DEZ 160 for which counted measurands are parametrized were inserted into the slot of a DEZ 160 with real-time information. The real-time information would then be processed as counted measurands.

DCF 775 You can set whether or not a real-time receiver is connected to the DEZ 160. It is set with <J> or <N> or by toggling.

Setting of Data Type **E7 B8**

”Data Input”,”Setting of Data Type”
(F1 → F2)

The DEZ 160 is displayed divided into 4 times 8 inputs. 4 different data types can be assigned to the groups selected with <Home> or <End>. These are:

- counted measurands
- real-time information
- single point information
- double-point information

The data type is set with < >↑or < >↓

You can allocate a different software debouncing time to each group. The debouncing times can be defined between 1 msec and 255 msec. They are directly entered by inputting the digits. The line “debouncing time” is not selected with the cursor.

The data type and debouncing time of an input group is allocated with <Cr>. The assignment of a group can be deleted with <Del>.

Invertation of Input **E7 B9**

”Data Input”,”Invertation of Input”
(F1 → F3)

Each individual input signal can be inverted with the DEZ 160. The individual inputs are displayed on the screen as switches which you can switch on and off by toggling. The inputs are selected with <→> or <←>.

Switch upwards = 0 = do not invert (default)

Switch downwards = 1 = invert.

Edge detection for real-time information **E7 B10**

”Data Input”,”Edge Detection for Real-time Information”
(F1 → F4)

For real-time information you can set whether the incoming and outgoing information or only the incoming information should be entered in the ring buffer.

Only the real-time information input is displayed as a switch. These can be switched on and off by toggling. The individual inputs are selected with <→> or <←>.

Switch upwards = off = only LOW/HIGH edge

Switch downwards = on = LOW/HIGH and HIGH/LOW edges (default)

Counted measurand **E7 B11**

”Data input”,”Counted Measurand”
(F1 → F5)

The 16-bit counted measurands are generated in the DEZ 160 and can be read out as a word. Since a total of only 16 words can be read out for the DEZ 160 and the first two words transfer the process state of the inputs, only 14 words are available for the counted measurand transfer. This number is reduced to 8 transfer words if real-time information is parametrized.

You must allocate the counter measurand registers 1 to 14 or 1 to 8 to the individual pulse inputs. Input 0 means that this input is not counted. If incorrect input is made, a comment appears on the screen and the input is not accepted.

You can also form summed counted measurands by allocating the same counted measurand register to several pulse inputs. Theoretically you can allocate 32 pulse inputs to 14 counted measurand registers in this way.

Counted measurand registers can only be allocated to inputs which were defined as counted measurand inputs in the “data allocation” menu.

Selection is with the cursor keys.

2.3 Data Archiving E6 B7

The archive function is only provided if the DEZ parametrization is called directly. If it is called from PRO → U130, the “Data Archive” function is not provided in the main menu since the main program archives the DEZ parameters.

Read file

”Data Archive”,”Read File”
(F2 → F1)

All the DEZ parameter files already created are listed alphabetically in a window. The extension .DZ1 , .DZ2 to .DZ8 defines the slot for which the DEZ 160 was parametrized.

The arrow marking the selected file can be moved with < >↑or < ↓. The lines are scrolled at the start and end of the window if more files exist than can be displayed in the window.

The selection is confirmed with <Cr> and the file is loaded into the user memory of the PUTE.

You can leave the window with <F9> or <Esc> without reading a file.

Write file

”Data Archive”,”Write File”
(F2 → F2)

The DEZ parameters are stored on the defined drive in “intel-hex” format. The system name entered in the menu “General Parameters” is used as file name. The module address is appended as extension to distinguish the different DEZ 160 of an outstation.

Example: MUSTER.DZ1 and MUSTER.DZ2

The station MUSTER contains two DEZ 160 at I/O slots 1 and 2.

Erase file

”Data Archive”,”Erase File”
(F2 → F3)

All the DEZ parameter files are listed in a window. The file to be deleted can be selected with < >↑or < >↓ The file is deleted after the selection has been confirmed with <Cr>.

The delete function can be aborted with <F9> or <Esc>.

Drive

”Data Archive”,”Drive”
(F2 → F4)

Drives A, B, C and D are provided for selection in a window.

The drive from which the DEZ parametrization program was started is the default value. If this is changed for example from C to A, access is now to drive A for the functions “Read File”, “Write File” and “Erase File”.

2.4 EPROM - Menu E6 B8

Only the EPROM programming station EPS 2000 can be addressed with this menu. It is linked with the serial interface COM1.

The EPROM used is a 27C256.

Read EPROM

”EPROM Menu”,”Read Eprom”
(F3 → F1)

EPROM reads the parameters, which can be displayed in the individual submenues of the “Data Input” by switching the display with <F8>. The parameters read in by EPROM are designated “module 0”. You can compare for example an EPROM with an archived file by reading in both parameter sets and switching the display back and forth with <F8>.

Program EPROM

”EPROM Menu”,”Program Eprom”
(F3 → F2)

The parameters are programmed on the EPROM starting with address 6000H.

Delete test

”EPROM Menu”,”EPROM blank check”
(F3 → F3)

You can check whether an EPROM is empty with this function.

2.4.1 Printer Output E6 B9

Start Printer

”Printer Output”,”Start Printer”
(F4 → F1)

The list with the DEZ parameters is printed.

Printer selection

”Printer Output”,”Selection of Printer”
(F4 → F2)

The printers DRU 096, DRU 120, DRU 292, DRU 293 or DRU 1200 can be selected.

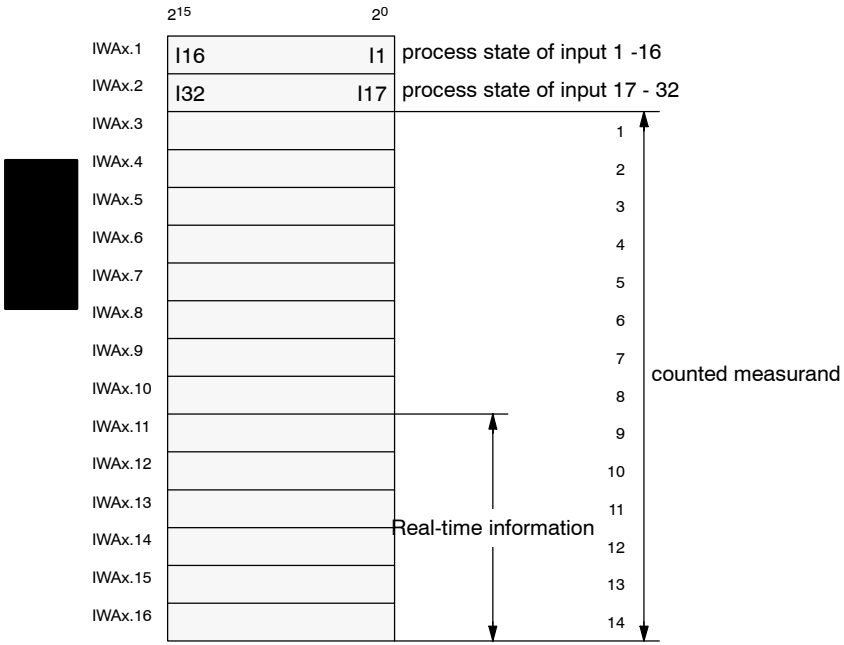
Near letter quality mode (NLQ) can be set for the DRU 120, DRU 292 and DRU 293 with <F5>.

Note The printers must be set to IBM graphic character set 2.

The printer output uses the Centronics interface (LPT1). Output using the serial interface is not advisable since it is already used to connect the PC*, the Eprom programming panel and the mouse.

Expert If you want to use a printer with serial interface nevertheless, you can detour the output in the MS-DOS level with MODE commands before starting the DEZ parametrization. The necessary instructions can be found in the MS-DOS handbook.

Chapter 3
Structure of Transmission Port



IWAx.11 to IWAx.16 are provided for counted measurands when parametrizing without real-time information.

Parametrizing with real-time information:

IWAx.11 and IWAx.14 = Status word
IWAx.12 and IWAx.15 = Real-time information/approx. time
IWAx.13 and IWAx.16 = Exact time/approx. time

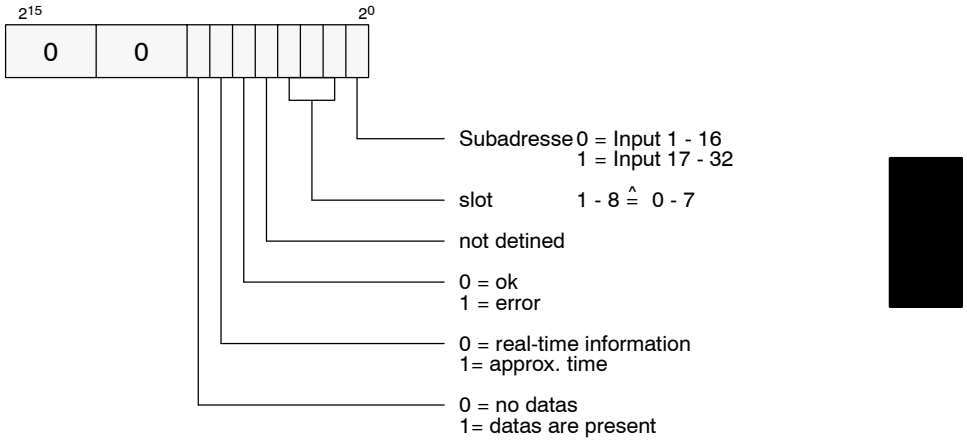


Figure 9 Status word

Part III
KOS 130/131 Parameterization

Chapter 1
General Instructions

There are two ways to input the parameters for the KOS 130/131.

- user input to the KOS 130/131 data model in the corresponding menues.

- transfer of the data model generated in PRO → U130 to the KOS 130/131 parametrization.

KOS 130P installed with COM → KOS130
The KOS parametrization program is started from the operating system level with C:\COM KOS130 or C:\KOS130P.

KOS 130P installed with PRO → U130
If you want to use the KOS parametrization program without PRO → U130, you can start it directly from the operating system level with the call C:\PRO-U130\KOS130P.

If the data model is generated by PRO → U130 and transferred in the KOS parametrization call, the tables “data for monitoring direction” and “data for control direction” as well as the general parameters are already filled in. The KOS- and SEAB-parameters are set to the default values (see chap. LEERER MERKER). The setpoint values are initialized to 0 and the pulse threshold for counted measurands is 255. The code A for “set transfer bit” is already entered for monitored information and measurands. You only need to give further input about ring buffer handling if you will require this type of processing.

Of course you can also change the initial values defined by PRO → U130 for the KOS parametrization.

☞ **Note** Remember that changes in the SU and SD assignments also must be taken into consideration in the instruction list.

No other changes have any effect on the instruction list. The changed parameters are stored in the file USTx.KOS.

Caution If an IL is generated in PRO → U130 after the KOS parametrization has been changed, the file USTx.KOS is overwritten with the values defined by PRO → U130. Therefore you must enter your changes again at the end.

Chapter 2
Handling

2.1 Main Menu E5 B1

The main menu appears after the KOS parametrization call. You can go to the individual submenues using the function keys <F1> - <F6>.

- <F1> Configure Parameter Lists
- <F2> Data Archive
- <F3> Transfer
- <F4> Printer Output
- <F5> EPROM Menu
- <F6> Reset of PADT Memory
- <F8> Switch Monochrom/Color
- <F9> End

2.2 Configure Parameter List E6 B1

A menu from which you can branch to the particular submenues appears.

2.2.1 Common Parameters E7 B1

”Configure Parameter Lists”,”Common parameters”
(F1 → F1)

The current date is displayed if this outstation is being processed for the first time. The date of the last time it was processed is displayed if an existing parametrization of diskette, hard disk, EPROM or KOS-RAM was read in.

If a **complete** EPROM was read in before the “process parameter list” call or the parameters were transferred from the KOS-RAM, the part number of the KOS firmware is displayed. The display of the firmware number and the date cannot be changed.

System A maximum of 8 characters can be entered. All characters are permitted. Backwards deletion is with the backspace key and input is terminated with <Cr>. However, input must not necessarily be made. If a system name was terminated or confirmed with <Cr>, it is faded into the upper right of each menu.

Comments

Operator Handled as for system but with a maximum of 16 characters.

SEAB version The SEAB version displayed in the inverse field can be toggled with <Cr>. The default value is SEAB-1F.

No. of Outstation A number between 0 and 126 can be entered. Always terminate with <Cr>.

2.2.2 SEAB Parameters E7 B2

”Configure Parameter Lists”,”SEAB Parameters”
(F1 → F2)

First the baud rate is interrogated. The default value is 600 Bd. A different baud rate can be selected by toggling with <Cr>.

The subsequent times are entered in tbit. Values between 1 and 255 or 60 and 65635 are permitted. Default value, see chap. 2.7.

Note If a telephone connection is used, you must set the wait time for an answer (Quit LM) to 600 tbit.

Note If an outstation U130 is driven on a line mixed with U120 outstations, the parameters must be entered as follows:

Lead time:	15 tbit
M5 lead time:	12 tbit
M5 trailer time:	12 tbit

2.2.3 KOS Parameters for SEAB-1F E7 B3

”Configure Parameter Lists”,”KOS Parameters”
(F1 → F3)

The KOS parameters are only required for operations with SEAB-1F. Therefore this menu cannot be called if SEAB-1N is selected.

- The deviation time integral (AZI) for 8-bit measurands (default = 64) and 10-bit measurands (default = 1024) is specified.

- You are asked how many event entries should occur before a buffer overflow warning is output. A maximum of 4096 events can be entered in the ring buffer. Default = 3072.

The input must always be terminated with <Cr>.

- You can specify whether reading of the ring buffer should be activated after each short polling (SP) or only after a previous general polling (GP). Default = SP. This can be set with the keys <J> or <N> or by toggling.

- Monitored information is stored in the SEAB telegram as converted by the KOS.

	1. D-Byte								2. D-Byte							
Bit	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Information	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

You can parametrize that this is not required in the KOS. Monitored information 1 would then lie in D2.0, monitored information 2 in D2.1 etc. You can set this with the keys <J> or <N> or by toggling.

- You can choose between two measurands scales. The default is a range from 0 - 1023, but this can be switched to 0 - 1000. Set by toggling.

- You are asked whether a DCF receiver will be connected. Set with the keys <J> or <N> or by toggling.

- You can set whether SEAB-1F telegrams should be transferred with 4 data bytes. Some master stations (A350, GD 80-STAZ) cannot process these telegrams, however. In this case set “no”. This means that no telegrams can be transferred from the ring buffer (e.g. real-time information). Furthermore, organization information is sent in a 2D special format. (See also chapter 3.1.14, U130 user handbook)

2.2.4 Assignment Lists for SEAB-1F E7 B4

”Configure Parameter Lists”, “Assignment lists”
(F1 → F4)

A menu appears from which you can call the submenues. The assignment lists are only required when operating with SEAB-1F. This menu therefore cannot be called if SEAB-1N was selected.

The inversely displayed fields always show which specifications are active.

You can select the data word in the table you want to define with <←> and <→> in all the submenues. In order to reassign a word, you must simply select the corresponding word, define the new data and set <Cr>.

Data for Monitoring Direction E8 B1

”Configure Parameter Lists”,”Assignment Lists”,”Data for Monitoring Direction”
(F1 → F4 → F1)

The data type can be changed with <→> and <←>. The group numbers are incremented with <PgUp> and decremented with <PgDn>.

If a data word was selected, the display shows at the lower right whether a transfer bit (A) is set and whether a ring buffer entry (R) should be made.

You can specify for real-time information whether the current process state of the information inputs should be transferred for a GP (G).

You can switch back and forth between yes and no by pressing the keys <A>, <G> or <R>.

For each assignment with <Cr> there is an automatic check whether the selected group number is still available and whether the maximum values for the data types are not exceeded. A remark is displayed if this is the case.

An SU multiplexer was included in order to double the transmission capacity of the sending direction. You can switch back and forth between the two SU ranges with <F7> and <F8>. If 2 SU are required, organization information with group number 0 must always be entered for WM737.

The following data types are processed:

❒	128	8-bit measurands	(max. 64 words)
❒	64	10-bit measurands	(max. 64 words)
❒	64	counted measurands	(max. 64 words)
❒	512	monitored information	(max. 32 words)
❒	512	transient information	(max. 32 words)
❒	256	real-time information only with Geadat U130	(max. 16 words)
❒	16	system information	(max. 1 word)

These limits refer to the SU multiplexer, for which a total of 80 words can be transferred. The limit for Geadat U030 is a maximum of 41 words.

Caution The time a monitoring information has to be set to be detected as an transient information, contains the SU transmission time and the IL-cycle time.
If the SU multiplexer is used, the SU transmission time will be longer.

Data for Control Direction **E8 B2**

”Configure Paramter Lists”,”Assignment lists”,”Data for Control Direction”
(F1 → F4 → F2)

The data type and group number are selected and entered in the same manner as for the data for the monitoring direction.

The following data types are processed:

- 256 Single commands (max. 16 words)
- 32 Digital or analog setpoint values (max. 32 words)

However, a total of only 41 words can be transferred.

Set Value Input **E8 B3**

”Configure Parameter Lists”,”Assignment Lists”,”Set Value Input”
(F1 → F4 → F3)

If setpoint values were entered in the menu for the control direction, these are also set in the menu for set value input. You can assign the data words a value between –32767 and +32767 (the sign must always be specified). The value parametrized here is output by the KOS after a power failure until a new setpoint value arrives from the master station. Default = 0.

Counter Value Processing **E8 B4**

”Cofigure Parameter Lists”,”Assignment Lists”,”Counter Value Processing”
(F1 → F4 → F4)

If counted measurands were entered in the menu for the monitoring direction, these are also set in the menu for counted measurand processing. You can define whether or not a transfer bit should be set for reloaded counted measurands by entering <A>. If you want to define pulse thresholds for the individual counted measurands, enter <I> and then a decimal number between 0 and 255. The input must be terminated with <Cr>. Default = 0.

❒ Example:
“Set transfer bit” was set for a counted measurand in the “Data for Monitoring direction” menu. The pulse threshold was set to 100. The counted measurand is always transferred after a short polling if the difference betwen the last transferred counted measurand and the current counted measurand is 100 count pulses.

”Configure Parameter Lists”,”Assignment List”,”Ring Buffer Handling”
(F1 → F4 → F5)

If you defined that data should be written to the ring buffer in the menu for the monitoring direction, you can define when the entry is to be made in this menu. Default is that the entry is made after each event. Times of 1, 5, 10, 15, 20, 30 minutes and 1, 2, 4, 8, 12, 24 hours can be defined as reload periods. The selection is made with <→> and <←> and set with <Cr>.

The following are defined as events:

- change in monitored information
- pulse threshold reached for counted measurands
- AZI reached for measurands

Note Ring buffer entries can only be made if the KOS is equipped with a 32 KB RAM at position E (see module description) and jumpers S43-S45 are inserted accordingly.

Real-time Information **E8 B6**

”Comfigure Parameter Lists”,”Assignment Lists”,”Real-time Information”
(F1 → F4 → F6)

Real-time information can be generated for GEADAT-U130 with a DEZ 160.

- 4D telegram = monitored information + exact time
- 2D telegram = only monitored information

The group numbers (A1 byte) of the real-time information (4D telegram) of the individual DEZ 160 are specified in this menu. The group number must agree with that of the real-time information (2D telegram) in the SU1 or SU2.

The real-time information in the 2D telegram always represents the current state of the information inputs at the moment of the polling.

Note In order to be able to transfer real-time information with a time stamp (4D telegram), the 32 KB RAM (position E) and the jumpers S43-S45 must be inserted on the KOS 130/131. (See module description).

2.2.5 Logical Message Numbers for SEAB-1N E7 B5

"Configure Parameter List","Logical message number"
(F1 → F5)

The logical message number is entered as a decimal number between 256 and 9999. There is one logical message number each for the monitoring and the control direction. This is only true for SEAB-1N.

- Monitoring direction = data from A130/U130
- Control direction = data to A130/U130

2.3 Data Archive E6 B2

If the KOS parametrization is called from PRO → U130, you need not archive the parameters with this menu. The data are automatically saved in the file USTx.KOS when you end parametrization and return to the PRO → U130 main program. If a station is archived on diskette in the PRO → U130 main program, this file is also saved.

Read

"Data Archive","Read"
(F2 → F1)

You are requested to enter with the path instruction the name of the file to be read. If the path instruction is omitted, the current index is read. You can also enter the drive designation.

Store

”Data Archive”,”Store”
(F2 → F2)

You are rqeuested to enter with the path instruction the name of the file into which you want to save. If the path instruction is omitted, you will save in the current index. You can also enter the drive designation.

Read A030 archive diskette

”Archiving”,”Read A030 archive diskette”
(F2 → F3)

Store to A030 archive diskette

”Archiving”,”Store to A030 archive diskette”
(F2 → F4)

Archive diskette:
An A030 archive diskette in drive A is accessed. Only the system name should be specified here. This name may have a mximum of 8 characters and corresponds to the system directory on the archive diskette. The program appends the extension .030. The file itself is written to the directory with the name PARKOS.

Directory

”Data Archive”,”Directory”
(F2 → F5)

You can enter the path instruction for the table of contents to be displayed. If you enter only <Cr>, the subindex of the current drive set before the program was called is displayed.

☞ **Note** When a parameter list is saved, there is a check whether a file with the same name already exists. A remark is displayed if this is the case and you are asked whether the file should be overwritten.

The data are stored in ”intel-hex” format. The program enters the current date in the parameter file before saving.

2.4 Transfer E6 B3

Parameter Lists from KOS

”Transfer”,”Parameter Lists from KOS”
(F3 → F1)

Before the data is transferred from the KOS to the PADT, you will be asked again whether this function should really be carried out. Confirmation with <J> starts the transfer.

Parameter Lists to KOS

”Transfer”,”Parameter Lists to KOS”
(F3 → F2)

Before the data is transferred from the PADT to the KOS, you will be asked again whether this function should really be carried out. Confirmation with <J> starts the transfer.

The KOS is stopped before parameters are transferred there, i.e. the telegram transfer to the master station is interrupted. The KOS is started again and the telegram transfer continued when the parameters have been transmitted.

The current date is transferred to the parameter RAM of the KOS when the data are transported. Thus you can always find out when data were last transferred to the KOS-RAM.

A remark on the screen shows whether the data transfer is running or whether it has been terminated. A message appears on the screen if there is an error.

The serial interface is initialized as follows:

- 9600 baud
- no parity bit
- 1 stop bit
- 8 data bits

2.5 Printer Output E6 B4

The printer output is used to log the entered parameters. Output is in DIN A4 format.

Start Printer

”Printer output”,”Start Printer”
(F4 → F1)

The following lists are printed:

- general parameters
- SEAB parameters
- KOS parameters only for SEAB-1F
- assignment lists only for SEAB-1F
- logical message number only for SEAB-1N

Selection of Printer

”Printer Output”,”Selection of Printer”
(F4 → F2)

One of the printers DRU 096, DRU 120, DRU 292, DRU 293 or DRU 1200 can be selected.

Near letter quality (NLQ) mode can be set with <F5> for DRU 120, DRU 292 and DRU 293.

Note The printers must be set to IBM graphic character set 2.

A message appears on the screen if the printer is not ready.

The printer output is sent to the Centronics interface (LPT1). Output via the serial interface is not advisable since this is already used to connect the operator interface of the KOS, the EPROM programming panel and the mouse.

Expert If you want to use a printer with serial interface nevertheless, you can detour the output in the MS-DOS level using MODE commands before starting the KOS parametrization. The necessary instructions can be found in the MS-DOS manual.

2.6 EPROM - Menu E6 B5

Only the EPROM programming station EPS 2000 can be addressed with this menu. It is linked with the serial interface COM1.

The EPROM used is a 27C256.
The firmware EPROM is a component of the KOS 130/131 module.

Reading Parameter Lists

”EPROM Menu”,”Reading Parameter Lists”
(F5 → F1)

The range from 7A00H to 7FFFH containing the parameter lists is read in.

Program Parameter Lists

”EPROM Menu”,”Program Parameter Lists”
(F5 → F2)

The range from 7A00H to 7FFFH which is to contain the parameter lists is defined.

Read EPROM

”EPROM Menu”,”Read EPROM”
(F5 → F3)

The range from 0000H to 7FFFH is read in.

Program EPROM

”EPROM Menu”,”Program EPROM”
(F5 0→ F4)

The range from 0000H to 7FFFH is described.

EPROM blank check

”EPROM Menu”,”EPROM blank check”
(F5 → F5)

The “EPROM blank check” function can be used to check whether the EPROM to be programmed is empty.

There is a check whether the EPROM was correctly inserted before each access to the EPROM. A message appears on the screen if this is not the case.

The EPROM is read or programmed in steps of 256 bytes. The area which was processed is displayed on the screen.

Only an empty range may be programmed, i.e. the range from 7A00H to 7FFFH must be deleted for the call <F2> “program parameter list”, and the whole EPROM must be deleted for the call <F4> ”program complete EPROM”.

You have several possibilities for EPROM creation:

Create new EPROM
Read in the KOS firmware from the firmware EPROM with the call <F3>, create or read in new parameter data with the corresponding menu and then write to an empty EPROM with <F4>.

Duplicate EPROM
Read in EPROM with the call <F3> and copy to an empty EPROM with the call <F4>.

Program parameter lists
Read in a parameter list from diskette, KOS or EPROM or create a new parameter list and then program on an EPROM already containing the KOS firmware with the call <F2>.

Change EPROM
Read in data with the call <F3>, change it with the menu ”process parameter lists” and program to an empty EPROM with the call <F4>.

☞ **Note** If you do not have ring buffer processing, you can also insert the parameter-EPROM in an unused slot (position E) (see Geadat U130 user handbook). In this case only the parameters in the range from 7A00h to 7FFFH are stored. The firmware is not copied.

⚠ **Caution You cannot copy the firmware EPROMs with this menu. Parameters are always also written to the new EPROM during programming. The default parameters are programmed if no changes were made.**

2.7 Reset PUTE Memory E5 B1

After the “reset memory in P500” call, you are again asked whether you are sure that this function should be carried out. If yes, all the data are deleted and the default parameters are set.

Default parameters:

SEAB version:	SEAB-1F
outstation number:	0
Baud rate:	600 Bd
Lead time:	5 tbit
Trailer time:	5 tbit
Pause time:	5 tbit
Quit LT	60 tbit
M5 lead time:	12 tbit
M5 trailer time:	12 tbit
AZI for MW8:	64
AZI for MW10:	1024
Buffer overflow warning at:	3072
Read ring buffer only to GP:	no
Convert monitored information:	yes
Measurand scaling:	0 - 1023
DCF-receiver:	no

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